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The American Journal *of* Orthopedic Surgery

I.

THE PRESIDENT'S ADDRESS.

THE FAMILY PHYSICIAN, THE SPECIALIST AND THE PATIENT.

LOUIS A. WEIGEL, M.D., ROCHESTER, N.Y.

In calling the seventeenth annual meeting of the American Orthopedic Association to order, I must give voice to my appreciation of the supreme confidence manifested by conferring the highest honor within its gift upon me. To be called upon to preside over the deliberations, of an association of international importance carries with it a grave responsibility; and I trust that, when this year's work has passed into history, I may have honestly earned the approbation of my fellow-members, and that the work done by them may have truly fulfilled the purpose of the Association, which, our Constitution tells us, should be "the advancement of orthopedic science and art." To those members who so generously came to the assistance of the President and furnished the scientific material for this year's meeting I tender my especial thanks.

My predecessors in office, in their annual addresses, discussed various phases of orthopedics, both American and foreign, its rank as a specialty, its past and future, its scope, its influence, its pathology, its institutions, its education and literature.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

As the ground within the specialty has been so thoroughly covered, it may be well to go outside of our own comparatively narrow sphere and consider briefly our relations and duties to the family physician and the patient.

The good old family doctor seems almost destined to disappear completely, and unfortunately so. As a recent writer says:* "Families have three or four doctors,—one for the grown people, one for the children, and so on. If I ask you whether you think that the specialist can fulfil every requirement that sick people need, I am sure you will agree that he cannot. He is good for one thing. He does not have general influence, nor does he have the power of mental influence on the patient. The family doctor combines the offices of a father confessor and a general adviser on very many subjects. We ought to call a specialist sometimes; but we must have the family doctor as well, in order to understand the constitution or diathesis, and to develop a true roundness of character in treating disease." It is undoubtedly true that the specialist or any number of specialists cannot take the place of the family adviser. It may be that the influence of the family physician is less potent than formerly, but this decline cannot be attributed to the growth of specialism. While this may be one of the causes, it is not the only one. In these days, where we have a multiplication of pathies, fads, patent medicines, etc., it is not strange that the practice of medicine has been pretty thoroughly divided up, and that patients fly from one thing to another and from one doctor to another without rhyme or reason. Of course, present-day fads are simply a repetition of history. The days of tar water, Perkins tractors, etc., are replaced by Christian Science, osteopathy, etc. The daily press, too, has assumed the rôle of teaching the public in matters medical, and its influence in spreading knowledge or error is certainly a very potent one. The conditions in the home even have undergone a great change. With the decadence of the family physician, the school of practical hygiene and medicine has passed from the home circle and been transferred to the newspaper and magazine,—certainly a change of questionable character. In some communities public health associations are established to give reliable instruction in matters pertaining to health, but their influence must necessarily be limited unless supplemented by personal instruction on the part of the family doctor, who may individualize and adapt conditions to surroundings. General rules cannot be made applicable to the individual.

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* D. W. Cheever, the *Quarterly Bulletin of the Harvard Medical Alumni Association*, 1903, p. 452.

At the present day the requirements and attainments of the ideal family doctor are somewhat different than they were formerly. Even though he may not think it advisable to undertake the treatment of every case or every condition that comes under his notice, he should, at least, be competent to make a reliable diagnosis, but it is a matter of daily observation that in this respect he is somewhat at fault. We all of us know how frequently patients come to us with the statement that their family physician had been treating them for months, perhaps years, and during that whole time never thought it necessary to make a physical examination. Many anxious mothers are consoled with the statement that an incipient deformity or distortion does not amount to anything and that the child will outgrow it, when, as a matter of fact, the tendency of such deformities or distortions is to increase with advancing years. Palpable conditions are overlooked or mistaken because of the neglect to have the patient undress for a proper physical examination. Only recently a child thirteen years of age was presented who was said to have spinal trouble which she would outgrow in time without treatment, and which, upon proper investigation, proved to be a case of double congenital dislocation of the hips. It is not necessary for me to multiply instances of this kind, as you are only too familiar with them. When patients have taken drugs or other treatment for months without obtaining the relief sought for, it is not surprising that they finally seek the services of quacks and charlatans, who would not receive the same degree of support from the public if the family doctor were more painstaking and conscientious in examination and treatment. Quackery thrives largely on the shortcomings of the medical profession and the limitations of medicine itself.

While we are justified in accusing the family physician of sins, both of commission and omission, it may be proper for us to make an examination of conscience and see where we ourselves are at fault in our relation both to him and the patient. It cannot be denied that working along one special line has a tendency to narrow our point of view, and sometimes to the detriment of the patient. The family physician who is not thus hampered and whose field of vision is necessarily very much broader may frequently give us material help in solving some perplexing problems. A judicious co-operation would inure many times to the benefit of all parties concerned.

A word may be said with reference to the education of the specialist. The specialist is not made in a day, nor can he be evolved from a medical college. Although there is a tendency in modern times to send full-fledged specialists into the world directly from college and university,—and a few of the influential medical journals advocate such a course,—I am still old-fashioned enough to believe that the specialist to be successful requires something more than the knowledge he gains at school. Even granting that the science and art of medicine of to-day is almost too great to be mastered by a single individual, one cannot become a broad and liberal-minded specialist before he has had the inestimable advantage of a general practice. A period of experience in a hospital or any other institution can never be considered an equivalent. At the bedside of the patient, in a private house, where the young physician is thrown upon his own responsibility, where he must struggle to make his own diagnosis, watch every symptom and be prepared for an emergency, he receives a training both of the mind and of the eye that can be acquired in no other way. After a period of probation and study of this character sufficiently long to develop the powers of perception to the highest degree, one is better fitted to confine his efforts to some special line of work and with a greater chance of success. It may be said that a specialist, like a poet, is born and not made. Certain qualities and aptitudes are innate, and are acquired with difficulty. It is not an uncommon experience for men to have certain fixed ideas of what they are especially fitted for. In the course of a few years, however, either by force of circumstances or by certain accidents, they drift away entirely from their preconceived ideals and engage in activities that perhaps they never dreamed of. For this reason, if for no other, a general practice becomes a necessity to bring out the special qualifications of a given person and demonstrate for what he is best fitted. As Dr. Cheever,* in an address, well says: "I feel that the specialist is not so useful if he began as a specialist, and never did anything else, as he would be if he had begun as a general practitioner, and had not only learned the general round of professional work by study, but had also practised it. It used to be said that a doctor ought to have ten years of general practice before he became a specialist. Perhaps that is not strictly true as to time, but the principle is true. I have been struck with this over and over again quite forcibly. I recall cases where the specialist was of great use to me in differentiating the disease of a single organ; but, as time went on and the case developed, I could not help noticing the fact that he saw that organ and nothing else, and that the patient's general condition was not so clearly present to his mind as it was to mine. It seems to me that the doctor's position is this: that the specialist is the person who is supposed to develop an unusual amount of knowledge on a limited theme. If he is called in simply to give treatment or to aid diagnosis on that little point, perhaps that will do; but it may do harm if he sees that one portion and overlooks the rest. He does not see justly. So I am more than ever convinced of the fact that, although young men who have settled in cities may be expected to have an unusual amount of knowledge and to be called in as experts, yet I am sure that in small communities the general practitioner is and always will remain the doctor."

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* *Loc. cit.*, p. 451.

It is incumbent upon this Association to promote a development and improvement of orthopedics by insisting upon the proper qualifications of men who are to take up this specialty. We should take special care in selecting candidates for membership, so that only those who show the greatest amount of special aptitude, in addition to a general knowledge of medicine, shall become associated with us. If we require of the family doctor that he be sufficiently well versed in all branches of medicine to make a diagnosis at least, we, on the other hand, should also be sufficiently well educated in general medicine to give proper weight to all conditions that may modify the treatment of a special case. This is surely not too much to expect of us. Perhaps the specialist of to-day may be defined as one who has given special attention and study to one branch of medicine in *addition* to a general knowledge of all other branches, such knowledge to be based on practical experience at the bedside in the home for a sufficient length of time to broaden the mind and to train his powers of observation and self-reliance. There are many things to be learned outside of the laboratory.

In my triumvirate I have placed the specialist in the middle, because he should form the connecting link in the chain of mutual confidence between the family physician and the patient, and also because he must sometimes act as a buffer to lessen the shock of a possible collision between them. There need not necessarily be any conflict between the family doctor and the specialist, and there would be a better feeling of fellowship between them if they co-operated more frequently in the treatment of a patient. I am afraid that we do not always follow up our patients sufficiently well to know the final result of our treatment. This is especially true of operative work. If we paid more attention to the subsequent history of the patient than to the immediate success of an operation, I am inclined to believe that we would many times change our views and modify our methods of treatment. The family physician, who is able to keep a patient under observation for a long time, is best fitted to aid us in this direction.

Medicine is classed as a liberal profession, but, unfortunately, many of its members are illiberal and bigoted. At times there is a lamentable absence of the *esprit du corps*. Narrow-mindedness and bigotry are responsible for many petty jealousies that do not benefit the patient, the one most vitally interested in the success of medical practice. Active co-operation, mutual confidence, and the practice of the Golden Rule certainly should mark the relation between the family doctor and the specialist. The charge has been made that loyalty to the family physician has been impaired by specialism, and given rise to hesitation and distrust of the family doctor. I am not inclined to agree with this sentiment, for I believe there are other and more potent causes to account for the apparent decadence of the family doctor.

The human mind is so constituted that it is always striving after the marvellous, the wonderful, and the unusual, while the commonplaces of every-day life attract no attention whatever. This was illustrated in the recent visit to this country of one of our corresponding members, which gave occasion to a newspaper discussion of orthopedics. You all know how assiduously and eagerly the public devoured the sensational stories, and accepted every statement as gospel truth, no matter how improbable or exaggerated it may have been. I simply refer to this to show how much the public is interested in medical matters, and how easily it is swayed in one direction or another. There is no question that our specialty has derived a direct benefit from the newspaper discussion, but it remains for us to educate the public as to what may be done and what may be impossible in orthopedic surgery. We may not be able to impress some people by our prosaic methods, but this should not deter us from dealing honestly and conscientiously with all who come under our care. In giving our best thought and attention to the patient, and seeking the co-operation of the family physician in all important matters, we will in return secure a degree of confidence that could not otherwise be attained; and, even though our best efforts may not always be appreciated at their true worth, we can, at least, have the consciousness of having done our duty.

Since our last meeting we have suffered the loss of an active member and a former president of the society. It is not necessary for me to write an elaborate eulogy of Dr. Abel Mix Phelps, because his work, his originality, and his contributions to scientific surgery are an enduring monument. The members of the Association who came in intimate contact with him fully appreciated his force of character. Although impetuous in the extreme, there was an element of kindness in his nature that was not generally known. There were many sides of his character that are worthy of emulation.

II.

THE CORRECTION OF DEFORMITY AT THE HIP, THE RESULT OF DISEASE: A STUDY OF THE BEST METHODS AND BEST POSITIONS.

VIRGIL P. GIBNEY, M.D., NEW YORK.

When Mr. Gant, the English surgeon, advocated subtrochanteric osteotomy for the correction of deformity resulting from hip disease, this operation was regarded as a distinct improvement over that advocated by the late Mr. Adams; namely, osteotomy through the femoral neck. For some years orthopedic surgeons have been operating after Gant's method, and papers with elaborately compiled statistics have been presented from time to time to the American Orthopedic Association. While some of our fellows have not been fully satisfied with the results of the operation, I think that it might be safe to say that the majority have looked upon this simple subcutaneous osteotomy about the level of the trochanter minor as the safest procedure extant for the correction of deformity at the hip. It is certainly within the experience of the writer of this paper to have encountered disastrous results from either the subcutaneous or the open operations through the joint; and, while a faulty technique may be the cause of some of the results, he, at least, prefers the Gant operation.

During the month of December, 1902, Professor Lorenz, in a paper read before the Orthopedic Section of the Academy of Medicine, advocated the "centric" correction of deformities of the hip, and he was so positive in his assertion that this was far preferable to the "excentric" that it has occurred to the writer that a discussion would not be inopportune or out of order. Hence this paper.

It is not intended to present an array of statistics, but to discuss the question from a clinical standpoint.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

Case 1.—A girl, L. G., nine years of age, was admitted to the Hospital for Ruptured and Crippled on February 24 of the present year. She had been under treatment in the Outpatient Department for a long time, and had previously been under treatment in the Post-graduate Hospital. Suffice it to say that a year before her admission to our hospital the disease was regarded as fully arrested, and the little deformity was considered as of no consequence. Shortly before her admission she began to walk poorly, and we found the hip pretty well locked, and that movements excited a little spasm. It was thought, however, that the ankylosis was fibrous; and, in view of the absence of any symptoms about the hip, she was on March 3 anæsthetized and subjected to forcible correction of the deformity by manual force. The joint was not moved, as in *brisement forcé*, but the pelvis was steadied and the limb pulled down into a good position, and the usual plaster of Paris bandage was applied for maintaining the correction. She rested poorly that night, and we were obliged to keep her in bed for about four weeks on account of a daily temperature and pain on handling. The plaster was removed on April 2, and the parts were found to be quite sensitive, yet there were no signs of abscess. She had lost flesh. Traction was employed temporarily, but on the 6th there was just enough tension above the trochanter major to suggest an aspiration, which was made with the large needle with negative results. The high temperature continued, ranging from 99° F. to 104° F. until the 20th, during which interval she had a good many night cries. Under an anæsthetic, on this date, an incision was made into the joint just above the trochanter, when some thickened pus and diseased bone were removed with a curette. The joint was pretty thoroughly emptied, and the wound closed with catgut without drain, and plaster of Paris was applied. Her improvement dated from that operation. She has not had any night cries since, the temperature has fallen to normal, and on April 30 the report is that her condition is all that can be desired.

Now this case is at least suggestive of damage done to tissues undergoing repair and the lighting up of the old inflammatory process, and it would seem that the operation for the relief of the joint tension was opportune. Taking into account the extremely sensitive condition induced by the forcible correction and the persistence of the temperature, it is fair to assume that an abscess with extensive suppuration would have resulted; and all this is traceable to the bloodless operation resorted to at the time of her admission.

On the other hand, there are cases innumerable where the same amount of force has been employed, the same correction secured, without any untoward symptoms. But the case I have cited is not a solitary one, and at the hospital we have long since learned that it is unsafe to resort to forcible correction where sinuses lead to the joint, no matter how long-standing these may be. Indeed, we hesitate to do a subtrochanteric osteotomy for fear that the osteotome may invade a focus of disease more or less active.

One is ready to admit that a longer limb can be secured by the "centric" correction, but one must also admit that it is exceedingly difficult to determine when a joint is ready for the employment of force enough to correct fully. Even if the forcible correction at the joint is always devoid of risk, the pathological dislocation and the destruction of the head and neck preclude the possibility of a limb as long as its fellow, and it may be asserted that the little difference in favor of a lengthened limb is hardly a good enough reason to make this an operation preferable to the osteotomy below the joint. Certain it is that many of the most satisfactory results, so far as improving the length of the limb is concerned, have been accomplished by subtrochanteric osteotomy. It is the experience of many who have collected statistics from the Hospital for Ruptured and Crippled to find a certain number of relapses after subtrochanteric osteotomy. It is also the experience of these gentlemen that relapses occur just about as frequently after forcible correction through the joint. It may be that our retention apparatus has not been sufficiently long employed, and the results obtained by Professor Lorenz may be due to prolonged use of plaster of Paris after the operation. It has long since been our conviction at the hospital that the plaster of Paris was not used long enough, and within the past two or three years it has been our custom to maintain this correction over long periods of time, say from three to six months.

The following case is one where relapses have occurred after osteotomies below the trochanter:—

Case 2.—A boy, now fifteen years of age, was admitted to the hospital in October, 1897, for the correction of deformity after hip disease. A day or two later the deformity was corrected by division of the adductors and the tensor vaginæ femoris and forcible correction. Plaster of Paris was employed, and on October 26 it was found, on removing the plaster, that the deformity was not fully corrected, so another attempt was made under an anæsthetic. On November 10, same year, the deformity had recurred in spite of the plaster of Paris; and the hip was stretched under ether, so that 180° was measured before the plaster was applied. On November 20, on removing the plaster, the best that could be had was 165°. In January, 1898, the deformity had increased while wearing a hip splint with thoracic attachment, and the best that could be had was 145°. So on the 12th an osteotomy through the trochanter minor, subcutaneously, was performed, the deformity being fully corrected. Plaster of Paris was employed, and on the following day he developed measles, and was taken to the Reception Hospital. On his return, at the end of a week or ten days, it was noted that the deformity was still 155° in extension. On August 4, 1898, his angle of deformity was still 155°, and he had suffered no inconvenience from any of the stretchings or operations. On January 7, 1899, an attempt was made to correct the deformity without an osteotomy, an angle of 175° being obtained. The plaster was removed on January 28, and a brace applied, 165° being the record at this time. He went into the country, and on May 3 he returned with two discharging sinuses, these having occurred in old cicatrices. At this time his angle of deformity was 160°. By July 26, 1899, it had reached 150°. He was discharged finally from the hospital on November 15, 1899, the sinuses having closed, and he was walking very well on a high shoe, but the limb was in deformity. He was readmitted May 31, 1901, his angle of deformity being 150° again. There was marked lordosis, and the trochanter was above Nélaton's line. On June 4 he had another osteotomy, Gant's, and he was kept in plaster until July 15. On July 20 measurements showed that his limb was down to 180°. The plaster was not continued, but he wore a brace, and on November 20 the best that could be obtained was 145°. There had been no acute symptoms of any kind, and he was walking without apparatus. On November 26 the limb was stretched again under ether and the adductors divided subcutaneously, and on May 10, 1902, his angle was 150°. He was discharged from the hospital again, and on April 14, 1903, he was readmitted, and in a few days thereafter, the deformity being quite as marked as ever, a cuneiform osteotomy was done through the trochanter and what remained of the head and neck. The base of the wedge was 1½ inch, and, when the limb was brought quite straight, the cut surfaces of bone came in apposition. This patient, it will be seen, had about five or six stretchings under ether, two Gant's osteotomies, and one cuneiform osteotomy, the last; and it is proposed to keep him in plaster for several months.

It has been suggested that, if disease does occur after forcible correction, the symptoms are of slight import, and that fixation in a well-fitting plaster of Paris bandage is sufficient to guard against any serious relapse. The case already reported in this paper is one that fails to substantiate this argument. Again, a great many surgeons believe that tuberculous meningitis is directly induced by the forcible breaking-up of an old tuberculous focus about which repair has already been established, and statistics are inadequate to convince surgeons that such is not the case. Our own studies at the hospital, based upon numerous tables of statistics, have failed to show that there is any direct relationship between forcible correction and tuberculous meningitis. The cases that are sometimes adduced as evidence are those in which the second stage of tuberculous meningitis has developed too soon after the operation, or where the first stage has developed too long after the operation. Still, a certain amount of respect must be paid to the old adage, "It is a risky thing to disturb a sleeping dog."

The subcutaneous operation so favored by orthopedic surgeons has been so bitterly assailed by general surgeons that it may be well for us to discuss the relative merits of the open and the subcutaneous operations. So simple an operation as subcutaneous achillotomy, done for so many years by orthopedic surgeons the world over, has been condemned by the general surgeon because, forsooth, a small vessel has been occasionally injured, and timid operators in this specialty have gone so far as to admit that the tendo Achillis should be divided by the open method. If the impetus given to bloodless surgery is to be productive of any good results, let us continue to resort to the subcutaneous division of tendons. There are a few orthopedic surgeons who claim that the tenotome is a valuable adjunct to our armamentarium.

If one does an osteotomy, it should, in the judgment of the writer, be a subcutaneous one, because the osteotome is just as tractable in the hands of a skilful operator as the tenotome. It serves as a probe or guide often, and one can tell whether he is in compact bony tissue or in spongy tissue. The instrument can be so directed as to avoid wounding anything more than the periosteum, and the little hemorrhage that takes place is of no account whatever.

The conviction has grown upon me that the position must be maintained for many months in a closely fitting plaster of Paris bandage. It is in evidence that recurrences have been due to short periods in plaster of Paris. When it is necessary to remove the plaster, then apply a closely fitting splint, like the Thomas, for several months afterwards. In some instances, an aluminum corset with a steel spring extending over the hip previously deformed, down the thigh acting as a lever, should take the place of the Thomas splint, but the principle is the same.

The question is often raised whether to have an ankylosed limb perfectly straight or slightly flexed. From my own experience in the management of these deformities I am convinced that the limb should be left as nearly straight as is possible. A certain amount of flexion will take place, but, if very slight, the patient certainly walks a great deal better and is in less danger of developing a painful hip in after years. Many cases of neuralgia of the limb or pain on walking have come under my observation, and I have been able to relieve them by correcting the deformity. There are, undoubtedly, many patients who prefer a slight flexion, so that they may sit more comfortably, but these belong to the younger class. It is the opinion, therefore, of the writer of this paper that ability to sit comfortably should be sacrificed to the ability to stand and walk erect.

DISCUSSION.

Dr. A. J. **STEELE** reported the case of a boy of eight years who had been in the hospital for several months with extreme flexion of both hips from old hip disease. The speaker said he had been making gentle traction, hoping to get the hips down. Dr. Lorenz called special attention to this case, and insisted that it was an admirable one for carrying out Lorenz's theory. In accordance with this advice the resisting tissues were divided and the necessary force used. The immediate result was very gratifying; but a few weeks later fever and pain indicated that the old tubercular disease had been rekindled, and in a few weeks more the boy died of tubercular meningitis. He thought, therefore, that one should make haste slowly in these old tubercular joint troubles. His own experience was that there was danger of tubercular meningitis if extreme force were used in these cases.

Dr. **RIDLON** placed on record five cases which he had operated upon immediately after Professor Lorenz's visit to Chicago. There were five hips in three patients. In four of these hips, after cutting subcutaneously the adductors and long flexors, he was able by very great force to correct the deformity of flexion and adduction, and obtained as good a position as desired. In the other hip he used as great force as he dared, after having cut the flexors and adductors, but could not correct the deformity. All of the cases had no motion when the operation was attempted. All were old cases, and all had flexion deformity of about a right angle with some adduction. In the fifth case Lorenz's recommendation of driving the osteotome as close to the acetabulum as possible was followed. The bone was divided as freely as seemed necessary; and then with considerable force the remainder of the bone was broken, and the adductors and flexors were cut freely and the deformity corrected. All of the cases had lived, and the plaster had been removed from all. In all the deformity had remained corrected; and, to his amazement, in all there were from five to ten degrees of motion.

Dr. **GOLDTHWAIT** placed on record a series of sixteen cases operated upon during the past winter at the clinic, mostly in adults, because it had been found that the relapses in adult life or after the age of seventeen were very much less frequent than in childhood. It had been their custom to keep the patients in a protection apparatus until this age was reached, and then operate. Among the adults there had been no relapses. Some of the pictures from these cases were exhibited.

Dr. **Shaffer** referred to several cases in which forcible means were used to correct the deformity of old hip disease. One of the cases was regarded by the hospital surgeons as one of dislocation, the deformity being so extreme. The patient was not suffering much pain at the time. He was etherized, and the deformity corrected; and it was demonstrated that there was no dislocation present. He had no doubt that as a result of the manipulation an abscess was now forming. Another case was one in which under ether the deformity was reduced very much as described by Dr. Ridlon. Thus far the results were negative. There were no particular symptoms. While he was open to conviction regarding the propriety of performing this operation in advanced cases, he was yet to be converted, because he had seen so many disastrous results follow forcible measures used simply for the correction of deformity in old cases of hip-joint disease.

Dr. **Joseph Kurtz**, of Los Angeles (by invitation), spoke of the question of the open or the subcutaneous method of osteotomy. Personally, he had long practised the open method of osteotomy because it was quicker and safer. Dr. Gibney had made the statement that some surgeons were afraid of injuring certain important structures; but there was no occasion for this, and with modern aseptic methods there was no reason to fear infection. A large incision was not demanded. The periosteum should be cut down upon, and then peeled off. With the osteotome it was very easy to divide the bone to the desired extent. There was a chisel made which was guarded by a projecting edge. This was pushed in under the periosteum. With two or three strokes one could readily break through the bone more quickly than by the subcutaneous method, and it was much safer.

Dr. **Gibney** said he was glad that Dr. Goldthwait had brought up the question of relapses in adults. It accorded with his own experience that relapses seldom occurred in adults. The last speaker said there was no reason to fear infection. He sincerely wished this was strictly true, but his own opinion was that even the surgeon most skilled in aseptic technique did sometimes get infection. The plea had been made for the open method because of the shorter time,—an argument which did not appeal to him. Yesterday he had done two supracondyloid osteotomies for knock-knee and two osteotomies for antero-posterior curvature of the tibia, and the whole time consumed from the time of beginning the ether to the close was about thirty-five minutes.

III.

SUBTROCHANTERIC OSTEOTOMY IN ADULTS, IN ADOLESCENTS, AND IN YOUNG CHILDREN.

· E. H. BRADFORD, M.D., BOSTON.

The fracture of so important a bone as the femur within a short distance of the pelvis in adults is a procedure not to be hastily undertaken. Non-union or delayed union is a possible consequence which would be deplorable. It is for this reason that a careful study of cases operated upon by this method is of value. From theoretical reasoning it would appear that the danger of non-union might be great from the fact that the operation is undertaken for deformity, and in the correction of deformity it is necessary to arrange for a union which would place the fragments of the bone at an angle. The distorted limb is usually flexed and abducted. In order that the resulting limb should be well under the patient, it is necessary that the lower fragment should be in the longitudinal axis of the body, leaving the upper fragment in its former distorted position. This causes considerable angle of the fragments. A union, therefore, must take place in a distorted position, and the first fear of a surgeon in undertaking the operation would be the possibility of non-union or of delayed union of bones in any except actively growing children.

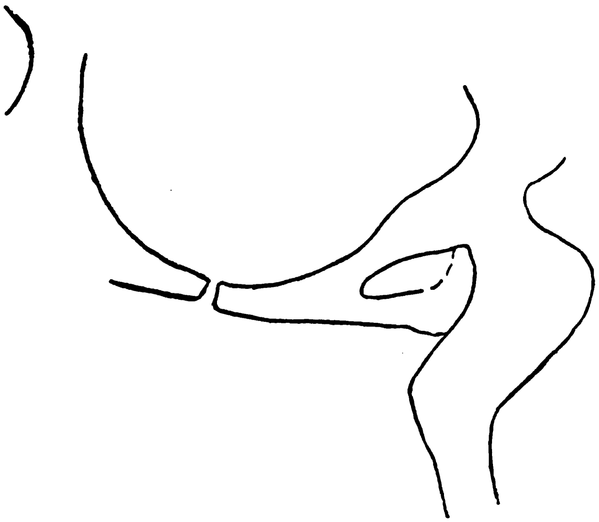
From the following cases it would appear that this danger of non-union is not great. It is possible that the danger of non-union or of delayed union is less in artificial fracture by the use of the osteotome than after accident, from the fact that, if the operation is carefully done, the periosteum is not injured. There is also little probability of the interposition of muscular or fibrous tissues between the fragments. It is certain that in the cases which have come under my care there appeared to be no grounds for apprehension of non-union.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

Case 1.—"P." A lady of forty-five years of age, of good health, with ankylosis at the hip joint, with a flexion of 80° and an abduction of 30°, dating from hip disease in early childhood. The patient was obliged by her occupation to stand constantly, which caused considerable pain about the hip, back, and thigh. This pain was most severe at the end of the day's work, and interfered seriously with the discharge of her duties, which demanded considerable activity. After careful consideration of the danger from the operation, subtrochanteric osteotomy was decided upon and performed. The operation was done in the usual way. The division of the bone was slightly oblique. No traction force was used, but the limb was placed in plaster with the flexion entirely corrected. The limb was abducted to 45°. Plaster of Paris was applied, and the patient placed in bed, secured by a bed frame. No reaction followed the operation, and her recovery began without interruption for two weeks. At this time a digestive disturbance was occasioned by extreme hot weather and slight error in diet. The patient was somewhat weakened by this, and nervous prostration followed, partly due to the reaction of the operation, partly to the confinement in bed of an active woman, and partly to the reaction which followed the over-activity and overwork previous to the operation. This condition lasted for the following three months. The union of the osteotomized femur, however, was firm at the end of two months, and the plaster was removed, but the patient was unable to walk about until three months later, and it was six months from the operation before the patient was able to resume her occupation. There has been no relapse, and a shrinking from the position of abduction only to about 10°, making the length of the limbs equal where previously there had been an actual shortening of an inch and a half, and a practical shortening, owing to the deformity and tilting of the pelvis, of four inches. The recovery has remained permanent without relapse for three years.

Case 2.—"S." Aged forty years, a school-teacher, stout and nervous person, with a deformity at the hip, with, however, a few degrees of motion at the hip joint. The limb was held in a position of flexion and abduction, with a practical shortening of three inches. Osteotomy was performed as in the previous case, with a more rapid and immediate recovery. The patient was able to return to her home from the hospital after two months. The plaster was removed, and the union seemed firm. Some nervous disturbance followed. Was unable to walk until nearly six months after the operation. She took up her occupation as school-teacher a year after the operation. The recovery has been complete, and the patient is now able to walk without difficulty.

Case 3.—"C." Patient twenty-five years of age. Hip disease with ankylosis and moderate deformity, with a practical shortening of three inches. Osteotomy was done in the ordinary way, and the patient made a good recovery in two months, and was able to walk without crutches in three months from the operation. The patient was light and active. No relapse occurred. A shrinking in a position of forced abduction from 45° to 20° followed, but enough was left to maintain the equality of the limb.



Tracing from a skiagram one year after subtrochanteric osteotomy, showing angle in the shaft of femur after correction of deformity.

Case 4.—"G." An active young gentleman, twenty-one years of age. Had grown rapidly, and was tall and slight, with a bad right-angled contraction and 10° of abduction at the right hip. Osteotomy was done, the limb being placed in a position of forced abduction. The case, however, was allowed to move about at the end of two months, and a loss of abduction resulted, so that the legs became parallel. Six months later a second operation was done, and a position of abduction again secured. This position remained, the patient being kept in bed for three months. The deformity was complicated, however, by a condition of knock-knee, which was found to have existed, making locomotion difficult, and an osteotomy at the lower end of the femur (McEwen's operation) correcting the knock was performed. This made the walking almost normal, and locomotion remained without noticeable limb and deformity. The cure has remained perfect for five years without relapse.

Case 5.—"R." A girl of eighteen, slight of figure. Suffered from hip disease in early childhood with the characteristic deformity, including marked shortening. Osteotomy was performed in the usual way, and a position of forced abduction maintained. The patient was kept in bed for nine weeks, wearing a retentive leather apparatus for six months, locomotion with crutches being permitted. No relapse has followed. The shortening has been entirely overcome.

It would appear, therefore, that non-union or delayed union is not to be considered in estimating the advantages to follow the operation.

The danger of recurrence of the deformity is also a factor of importance in judging of the ultimate value of the procedure. Where marked deformity exists following hip disease, to an extent to justify subtrochanteric osteotomy for the correction of the deformity, the conditions are usually of firm ankylosis at the hip joint, with a faulty position of the limb. The femur is strongly abducted and strongly flexed. There is a certain amount of actual shortening from the subluxation of the femur, from the absorption of the head and the enlargement of the acetabulum, and there is considerable degree of practical shortening. The functional benefit which is obtained from the operation consists not only in correcting the abduction, but in causing a union in a strongly abducted position, the amount of abduction being proportionate to the amount of practical shortening; for it will be readily seen that, if the limb which was abducted at 45° from the longitudinal axis of the body be abducted to a corresponding extent, the pelvis, which was tilted in such a way that the affected side is raised, will, when the abduction becomes fixed by ankylosis, become tilted in exactly the opposite direction, and the well side will become the elevated one, and the lower side the one previously raised.

By this means it will be found that a shortening to the extent of three or even four inches can be overcome. It is evidently necessary that the union under these circumstances should be firm. Unless the pelvis adapts itself by the approach of the normal leg to the corrected position, the patient cannot walk. Either the well limb must be brought to the new position, or the limb operated upon will return to its former distortion. There is, therefore, a constant tendency for the limb to fall back into its former position, not so much from muscular action of the adductor muscles as from the constant pull of the weight of the leg, and the constant tendency on the part of the patient to bring the leg toward the median line. It would appear that this tendency to relapse is greater in children than in adults, probably for the reason that in growing bone the ossification and union of fractures is less of a bony character, or that the ligamentous union remains longer in adults where either non-union exists or strong union. This would appear to be the case from the comparative results in the following three cases: —

CASE 6.—"S." A rapidly growing boy of thirteen was operated upon for bad deformity at the hip, following severe hip disease. The usual correction followed with no apparent relapse for a year following the operation. The boy then grew rapidly, and a recurrence of the deformity took place, so that at the age of eighteen there was a shortening of four inches, partly due to the abduction and partly due to the greater growth of the other limb. The patient died six years later of phthisis. At the time of death the limbs were parallel, and there was but little flexion and no abduction, but the position of forced abduction and gain in length of the limb had been lost.

CASES 7 AND 8.—"A" and "B." Boys of twelve and thirteen years of age respectively, both rapidly growing, and the operation being the same as in Case 7. Loss of forced abduction in both instances, the limb remaining in a position parallel to the long axis of the body, but with a loss of the position of forced abduction.

If these conclusions are correct, it would appear that it is necessary for children to wear retentive apparatus or to be kept in a recumbent position relatively longer than would usually be the case after fracture. It is necessary that retentive apparatus in children should be worn longer than in adults, partly also from the active nature of children, who, as soon as discomfort is relieved and any pain on motion ceases, are apt to throw weight on the limb without careful consideration of the way in which the weight falls. Furthermore, as the weight of children is less than that in adults, the child attempts to use the limb more quickly than could be done in adults, and for this reason less care is exercised in guarding the limb in the corrected position. It would appear that not only should no child be allowed to walk upon the limb until eight weeks has elapsed after the operation, and a subsequent period of eight weeks should be insisted on for semi-recumbent treatment, in order to prevent the possibility of relapse of the deformity; and in rapidly growing children a longer time is needed.

Another factor to be considered is the tendency in growing bone to reproduce by growth the position of the deformity. This would be apparently the case in all rapidly growing children that have come under my care, and it is for this reason that the operation does not seem to adapt itself to that of the very rapidly growing period. Where the operation is undertaken in younger children, a long after treatment should be insisted on. This is also true, to a degree, in early adolescents; but, as the growth of the bone is nearly accomplished, the factor to be considered is the care of after-treatment until the bone is united rather than the subsequent growth of the bone.

In brief, it may be said that the operation of subtrochanteric osteotomy for the correction of the deformity following hip disease is one which can be done in adults without fear of non-union, or even in middle life, and that the danger of relapse is greater when the operation is done in childhood or in rapidly growing years. The danger of non-union is apparently not an imminent one when the operation is done in adults, but the period of convalescence and disability after the operation is comparatively long when the operation is undertaken in middle life. For this reason it would seem to be better surgery to defer the operation, when possible, in young childhood until the period of rapid growth has been passed.

IV.

THE MECHANICAL *v.* THE OPERATIVE TREATMENT OF RACHITIC DEFORMITIES OF THE LOWER EXTREMITIES, PRESENTING A NEW OSTEOCLAST.

R. TUNSTALL TAYLOR, M.D., BALTIMORE.

What I have to say is very brief in this connection, and is in behalf of the immediate correction of rachitic deformities of the lower extremities by either manual or mechanical straightening in the stage of softening, or osteoclasis or osteotomy in the stage of eburnation.

In 109 consecutive cases at the Hospital for Crippled and Deformed Children, the following deformities (genu valgum 42, genu varum 59, and anterior bowing of the tibia 8) we have operated with only two relapses and one over-correction (a genu valgum complicating a genu varum, requiring a secondary operation to obtain a satisfactory result).

We have not discriminated, as is usually done, and put braces on the very young with flexible bones, but simply under ether straightened these legs manually or instrumentally, used fixation in plaster in slight over-correction for four to six weeks, and instituted proper feeding, good hygiene, and fixation on a Bradford frame, until all symptoms of the so-called "acute rickets" are passed, as shown by absence of the usual manifestations and presence of improved nutrition.

In only two cases, so far as I can find in our records, have braces been employed, and these were not satisfactory in the results obtained.

My reasons for holding these views are:—

First. When we take into consideration the primary cost of braces to this class of cases, which we find among the negroes,

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Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

Italians, and poorer classes of Americans in our dispensaries, we must needs feel that any immediate correction of the deformity which will obviate the expense of braces is desirable.

Second. The objection raised by one of my New York friends, that they "could not habitually operate on bow-legs and knock-knees there, because the parents would not consent, and 'had seen other children with suitable braces for the deformity,'" we meet, *not* by suggesting "*an operation* to break the legs," but by "a suggestion that we give the child a little gas and bend the legs straight," which we do often then and there. Seldom are we refused, especially when we tell them that the child's legs will have to be held straight in plaster of Paris for four to six weeks, and will require nothing to keep the deformity from returning.

Third. The danger of these operations needs not deter us in the slightest degree with modern asepsis (I speak of osteotomy) from resorting to the operative method. Osteoclasis for genu varum is one of our simplest and most harmless procedures, even standing ahead of tenotomy of the tendo Achillis in its simplicity.

We have not infrequently sent home the same day that the operation was done in the dispensary, not only the cases of genu varum after osteoclasis, but genu valgum also.

With plenty of padding under the cast, especially at the seat of the fracture and between the toes, these patients have little or no discomfort except from the restraint offered by the plaster, and are cured by the time the braces, had they been ordered, would have come from the instrument-maker and been properly adjusted to be worn in the daytime.

I say "daytime," for, with the usual forms of braces for the rachitic deformities of the lower extremities, we have the shoes as the lower attachment, and hence we have them taken off for ten hours at night and for two hours at mid-day for the nap then. Twelve hours with and twelve hours without braces in the twenty-four!

Fourth. The comparison of the length of time the child has to submit to the discomfort of the plaster bandages *versus* the braces is wholly in favor of the operative method.

In conclusion, I wish to present to the Association a new osteoclast, which I have devised on the lever principle instead of the screw, as seen in Rizzoli's, Grattan's, Colin's, and Lorenz's osteoclasts.

It consists of a T-shaped base, the arms of the T being some twelve inches wide and the stem some thirty-six inches long. Arising from the intersection of the arms and on the stem is an arc some twelve inches high at its summit and twelve inches wide at its base.

Some three inches above and parallel with the stem of the base is a movable half-inch square rod which may slide backward and forward through slots in the arc.

From the summit of the arc depends the short arm of the lever some nine inches down to its attachment to the movable rod. The long arm of the lever extends backward at a right angle to the short arm some twenty-four inches. It is fastened at the top of the arch by a bolt allowing free play.

Its attachment to the movable rod is by means of a notch to receive the rod, an inch by one-fourth of an inch slot on the sides, through which may pass and play a pin into one of a series of holes which can be used to regulate the length of the movable rod beyond the top of the T where it has attached, by a swivel joint, a pressure plate.

Two C-shaped arcs of the usual type are attached and regulated by set screws on the arms of the T for children for different length legs.

For adjustment to legs of varying circumferences the pin through the slot can be adjusted, so that, when the lever is pressed down after the leg has been placed against the C-pieces, the forward thrust of the movable rod may be extreme. For genu valgum both C-pieces may be put on one side.

The advantages claimed for this device are the rapidity of the fracture and release, which cannot be obtained with the other osteoclasts. It can be taken apart readily for carrying.

V.

THE SURGICAL PATHOLOGY OF GENU VARUM AND GENU VALGUM.

WALLACE BLANCHARD, M.D., CHICAGO.

All surgical proceedings should be governed and bounded by the indications and limitations of existing pathological knowledge. I do not know that I can add anything to the present accepted pathology of genu varum and genu valgum, but I may be able to demonstrate that there is occasionally a wide divergence between the well-known pathological indications, on the one hand, and the surgical procedures, on the other. Although genu varum and genu valgum are usually rachitic deformities, yet it is well understood that a very considerable proportion of these deformities of the legs occur in children in whom no symptoms of rickets are observed.

Eburnation may be premature or dilatory without any actual disease, just as dentition or adolescence may be early or late without pathological significance. The healthy, well-nourished child may walk early and have bones that harden slowly, and a deformity of the legs that is only apparently rachitic may develop.

The skiagraphic observation of a large number of cases of genu varum and genu valgum would seem to prove quite conclusively that these deformities very largely follow fixed laws of development.

Different healthy individuals show the normal curves in the long bones to a more or less pronounced degree, and it has been observed that the greater variational tendency lies in the natural curves to exaggerate and become deformities.

Advanced genu varum generally shows three contributing curves, the primary deviation being usually an exaggeration

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of the normal out-bend in the lower third of the femur. This is the typical first stage.

As the deformity progresses and leverage on the long bones increases, succeeding out-bends follow, usually in this order: first, in the upper third of the tibia, and this bend usually becomes the most pronounced; second, in the lower third of the tibia, with a succeeding slight out-curve between these last two pronounced bends.

The changed direction of the axis of the lower end of the femur, of course, changes the direction and tilts the normal level plane of the condyle. I have described a typical case of bow-leg in which the central deformity point—that is, the apex of the deformity—is in the upper tibial shaft. The only logical point of correction, either by osteotomy or osteoclasis, is at the apex of the deformity. There the least correction is necessary to obtain a perfect result, and the leg can be lengthened to the best advantage.

An occasional exception to the usual rule is when the only marked deformity bend is an exaggeration of the normal out-curve of the lower femoral shaft. In a bow-leg of this character the outer condyle appears to be lengthened and enlarged.

In a considerable number of skiagraphs I failed to find a case in which the condyles deviated from normal except in conformity to the altered direction of the lower femoral shafts.

Another exception to the usual rule of development is where the most pronounced deviation from normal occurs in an outward bend in the lower third of the tibia. In cases of this character a correction at any point far removed from the culminating point of the deformity cannot give any compensatory corrective results.

Fig. 1 is a skiagram of bow-legs, and is selected as illustrating several conditions. The child is eight years of age. The original bone deformity was undoubtedly an increase in the normal out-curves of the femurs, and the secondary tibial out-bends subsequently became the most pronounced. Four years of brace treatment have done but little more than to slightly correct the deformity by opening up the inner knee articulations so that the deformity is nearly doubled when standing. Of course, these bones are now too firm to be affected even slightly by braces, which serve only to enrich the instrument-makers and satisfy the parents that something is being done.

The skiagraphic study of genu valgum in various stages clearly demonstrates that, like genu varum, a large majority of the cases follow well-defined lines of development, the initial deformity being usually an inward bend of the tibia, from three to six centimetres, below the head. As the deformity progresses, a distributed inward curve develops throughout the remainder of the tibial shaft, accompanied by outward rotation. The upper portion of the fibula retains its

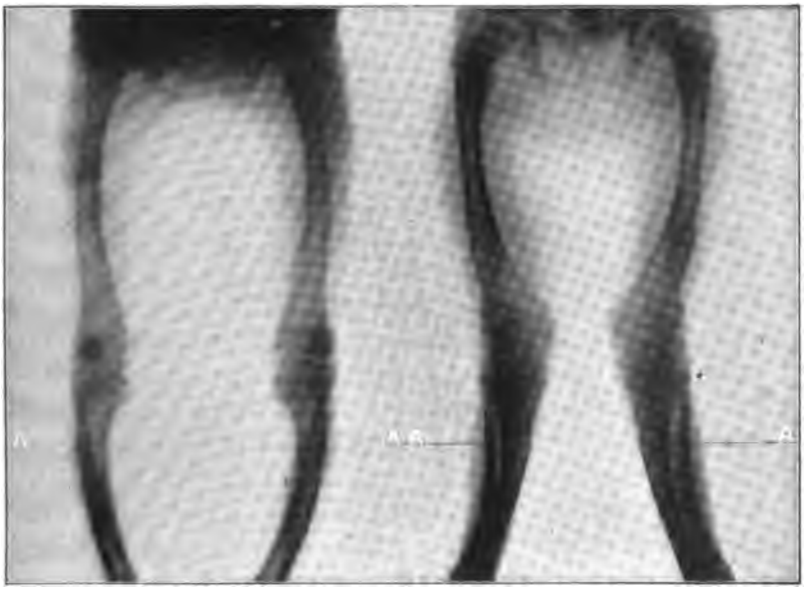

Fig. 1. **Fig. 2.**

Fig. 1. Skiagram of a typical case of genu varum, with the central deformity in the upper third of the tibia.

Letter A indicates the only logical point for over-correction.

Fig. 2. Skiagram of a typical case of genu valgum, with the central deformity in the upper third of the tibia.

Letter A indicates the only logical point for correction.

normal shape, but develops a sharp inward curve in its lower third. The normal space between the tibia and the fibula in their lower thirds becomes obliterated.

With this condition of deformity existing for a considerable period, with the body weight transferred to the outer condyles, with the external hamstring tendon shortened, and the internal hamstring overstretched and relaxed, we have a typical case as it is usually presented for correction.

Skiagraphic observation failed to show any marked deviation from normal in the condyles.

The only advantageous point for correction is at the apex of the inward convexity and primary seat of the deformity in the upper portion of the tibia, where the least operative correction is required for the successful obliteration of the deformity and lengthening of the leg.

Fig. 2 is a skiagram of a typical case of genu valgum.

Perhaps Professor Lorenz has been chiefly responsible for keeping alive the scientific superstition of shortened and elongated condyles by his operation for genu valgum of overstretching the external hamstring tendon and putting the leg in plaster for a month, and in braces for a year thereafter, on the theory that the internal condyle would diminish with increased pressure, or that the external condyle, when relieved of pressure, would elongate, and so correct the deformity. This is a theory in direct violation of the now almost universally accepted law of Wolff. Lorenz[1] says that he has recently abandoned this operation, and gives as his reason that "a loose joint is to be feared, and, besides, it takes too much time." As a substitute, he advances central epiphysiolysis as an ideal operation, and commends it to the exclusion of all others.

The apparatus for accomplishing epiphysiolysis is quite fully described and illustrated in a paper recently published by Dr. Max Reiner,[2] assistant at Lorenz's Universität Ambulatorium for Orthopedic Surgery at Vienna. The apparatus used is screwed like a vise to the operating table, and holds the lower thigh firmly while the leg is worked like a lever. The operator stands with the leg on his right, with the forefinger of his left hand in a groove in the apparatus directly under the epiphysis, with both hands grasping the knee, with the fore-arm resting low down on the outside of the patient's ankle. In this position the operator may throw his entire weight on the distal end of the lever, giving him tremendous power.

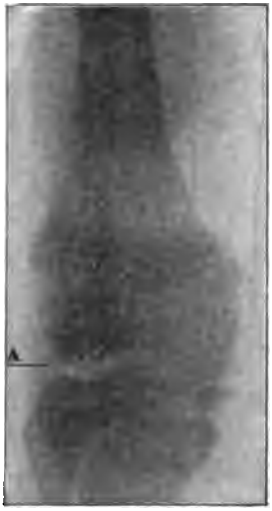

FIG. 3.

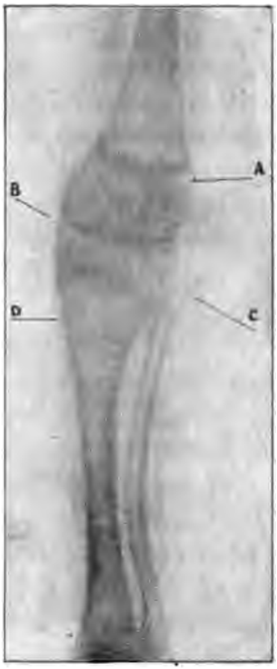

FIG. 4.

FIG. 3. A reproduction of Fig. 6 in Dr. Max Reiner's paper on epiphysiolysis. Letter A indicates the opening of the outer half of the joint.

FIG. 4. A reproduction of Fig. 10 after Reiner. Letter A indicates a separation of the epiphysis from the diaphysis, Letters B and C the tilted angle of the head of the tibia, and Letter D the uncorrected central deformity in the tibia.

The operator is directed to alternately increase and relax the downward pressure until the deformity is corrected.

With a view of ascertaining the feasibility of producing epiphysiolysis, I have had constructed the fixation apparatus from descriptions and illustrations given by Reiner. The apparatus accomplishes all that is required of it; that is, a perfect fixation. I am convinced that one may occasionally get a separation of the epiphysis, but that the soft parts will give way under the stress in a majority of cases before epiphysiolysis is accomplished. Of course, a fracture through the epiphysis can only be obtained by the leverage power transmitted through the external hamstring tendon and ligaments. Which is more likely to occur, a fracture through the epiphysis or a separation of the external articulation?

Reiner answers the question by claiming that he is almost invariably successful in disjoining and shifting the epiphysis, and gives a number of illustrations from skiagrams to prove his point. I here present copies of the two most distinct of his skiagraphic illustrations. The first, Fig. 3, forty-four days after operation, clearly shows that the outer half of the joint has been widely separated, sufficiently so, indeed, to neutralize a pronounced knock-knee without epiphysiolysis, the epiphysis having apparently remained undisturbed, though Reiner thinks otherwise.

The second illustration, Fig. 4, fifty-eight days after operation, shows that epiphysiolysis has been accomplished, and that the normal relation of epiphysis and diaphysis has been shifted. It also shows that the outer half of the articulation has been separated, necessitating the over-stretching or rupturing of the external hamstring tendon. This same illustration also shows very nicely the central deformity in the upper tibial shaft.

In opening the outer half of the joint and separating the epiphysis, the straightening of the leg has been accomplished after a fashion, but in bringing the bent tibia to a perpendicular the uncorrected upper deformity curve in the tibial shaft has tipped the tibial head to an angle of 45°. It is possible that a year or two in plaster of Paris, dressings, and iron braces may assist nature in welding this aggregation of malpositions into a leg that may possibly be symmetrical and serviceable, but it is rather more than doubtful.

Reiner says that, when attempting epiphysiolysis, he occasionally gets an infraction above the epiphysis. I have frequently used the Grattan osteoclast with one resistance bar placed against the condyle below the epiphysis and the second resistance bar about six centimetres above, and have invariably found that I obtained an osteoclasis in the shaft as remote from the epiphysis as the upper resistance bar would allow.

In my experience the lower end of the femoral shaft remains friable, and will bend without fracture six or eight years after eburnation has become so complete that the tibia will fracture with a loud snap.

Reiner places the limits of age for epiphysiolysis at from seven years to seventeen and a half while Lorenz places it at from five to sixteen years.

Reiner practically admits the frequent inefficacy of the operation when, in closing his paper, he says, "There is danger of the return of the deformity after the removal of the plaster bandage, in which case apply retention apparatus for a prolonged period."

Since the central point of the deformity is usually in the upper third of the tibial shaft, central epiphysiolysis, even if accomplished, is a misnomer. The term "eccentric epiphysiolysis" would be more appropriate to the operation, which, at best, is only the production of a deformity in one bone to offset the deformity in another.

Epiphysiolysis, like the bloodless reduction of congenital hip dislocation, is of Italian origin. Dr. Codivilla, of Bologna, reported on a large number operated upon in this matter before the adoption of the method in Vienna.

An occasional exception to the general rule of development of genu valgum is seen in the partial or entire obliteration of the normal out-curve of the lower third of the femur, and the out-curve may become absolutely reversed. This changed direction of the lower end of the femur produces a misleading appearance of elongated inner condyles. The normal level of the condyles and articulations have been tilted several degrees. Even in these cases the deformity is not central in the condyles or articulations, but at the abnormal bends in the femoral shafts above. In these cases the only logical point of correction is at the centre of deformity. After the correction has been made and the normal direction of the femur has been restored, it will be found that the condyles are normal.

In these cases, if in any, epiphysiolysis would be permissible, though I believe the operation to be most unfortunate when most successful; and it remains to be proven that the separation of the epiphysis does not endanger bone development. After two trials, in which I have faithfully followed Reiner's method, I have only succeeded in over stretching the external hamstring and opening up the outer half of the joint. The operations were followed by considerable swelling and severe pain, and I do not feel justified in continuing the use of so dubious a procedure.

Another rare exception to the rule in genu valgum is where the chief deformity is an inward bend in the lower half of the tibia. Here, also, the only logical point of correction is at the apex of the deformity.

Osteotomy is undoubtedly the most popular operation for the correction of severe rachitic deformities of the legs, yet it has many disadvantages when compared with osteoclasis performed with the aid of the perfected Grattan osteoclast. Some of the disadvantages are: time required for operation; the danger of infection, which, though it may be slight, nevertheless exists; time, care, and expense necessary for antiseptic precautions; and the pain that always accompanies an open wound. But the most serious objection to osteotomy is the delayed union as compared with union after osteoclasis. This is undoubtedly due to the severing of the continuity of the bone shaft and the carrying of soft tissue into the open space with the chisel. This delayed union has frequently to be supplemented by post-operative treatment, which is never required after rapid osteoclasis.

Rapid osteoclasis, as practised at the Home for Destitute Crippled Children in Chicago, may be briefly described as follows: Ether is administered so rapidly that in two minutes the patient is ready for operation. The bending or breaking

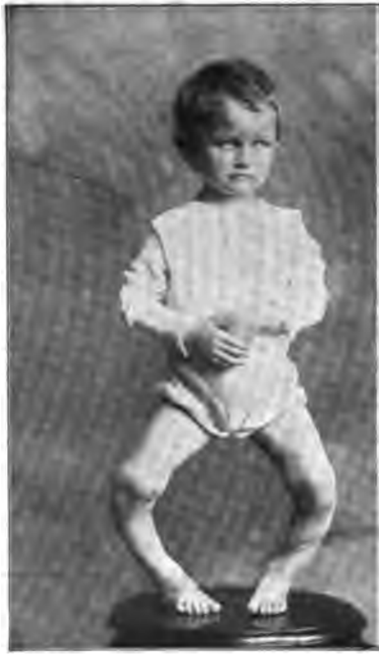

Fig. 5.

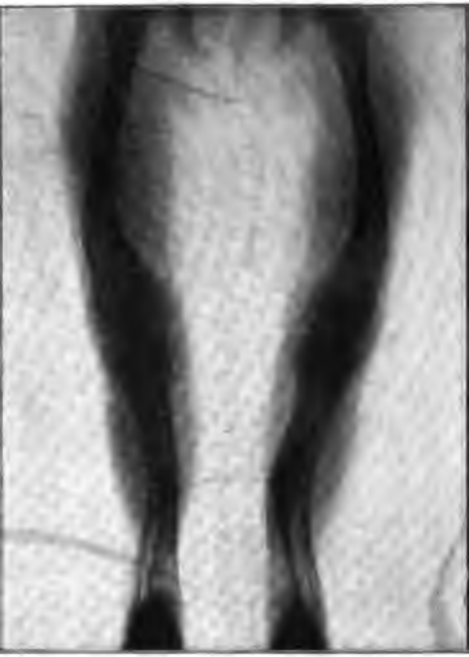

Fig. 6.

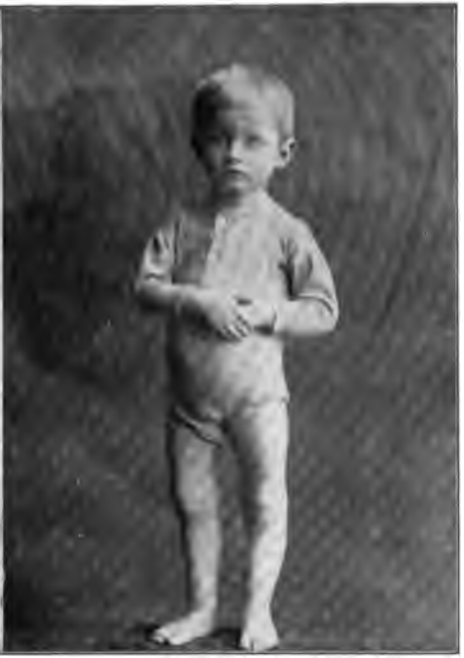

Fig. 7.

Fig. 5. A typical case of genu varum.

Fig. 6. Skiagram showing over-correction of the tibia at the apex of the deformity.

Fig. 7. The same case six weeks after the operation, showing that the over-correction has assimilated into the general contour, producing symmetrical legs.

of the bone in the osteoclast rarely takes more than six or eight seconds. The deformity is over-corrected by hand and held while a plaster bandage is applied. Seldom more than five minutes is consumed in the application and setting of the plaster bandage, and eight minutes suffice for the anæsthetic and operation, and the patient is removed from the table. The brevity of the anæsthesia necessitates the administration of but a small quantity of ether, permitting the patient to escape nausea and vomiting; and the rapidity of the operation is necessary to preserve the soft parts from bruising.

In bow-leg, with three contributing curves, the apex of the most prominent is usually selected for the operative point, and over-correction is made not only sufficient to correct the curve attacked, but continued sufficiently to neutralize the two minor deformity curves.

Fig. 5 represents a severe case of bow-leg. The only operation was an over-correction of the tibia just above the middle, in the apex of the deformity. The skiagram of this case, Fig. 6, shows that the two minor curves and the over-correction curve, though pronounced, have neutralized each other. The over-correction has lengthened the legs about six centimetres, and, as will be seen in Fig. 7, has assimilated into the general contour of the legs, producing a perfectly symmetrical appearance.

To illustrate knock-knee correction to the best advantage, I have selected a bilateral case, as will be seen in Fig. 8, the only deformity being in the left tibia, about three centimetres below the head. In this case the only operation was an osteoclasis at the apex of the deformity in the tibia, with slight over-correction. The result will be seen to be perfect, both in the skiagram, Fig. 9, and the photograph taken six weeks after the operation, Fig. 10. By comparison of the two legs in the skiagram, it will be seen that there is practically no difference in thecondyles.

Rapid unions are the invariable rule following osteoclasis, and in six weeks after the operation the patient is walking on straight legs, without braces of any kind. A record of

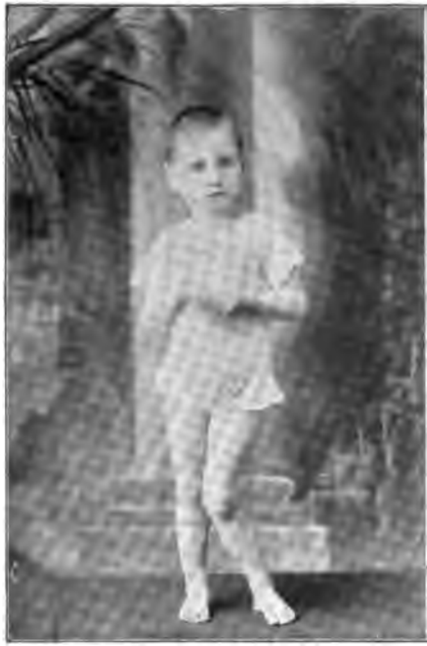

FIG. 8.

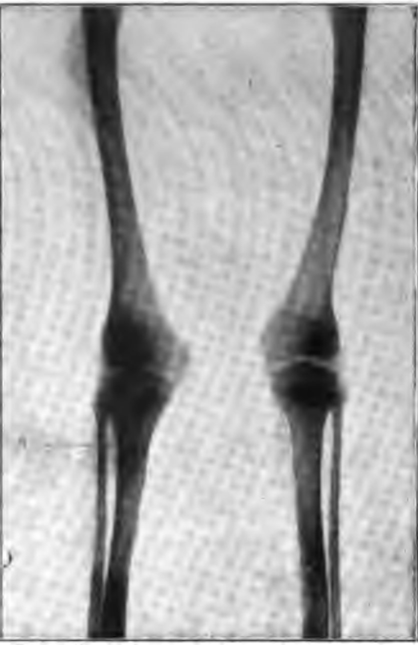

FIG. 9.

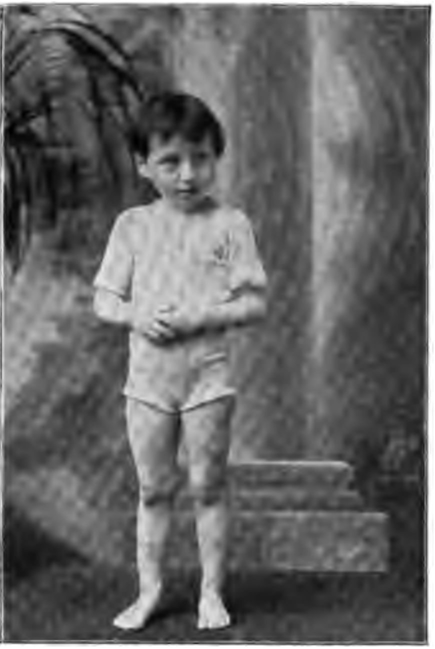

FIG. 10.

FIG. 8. A case of bilateral genu valgum, with the central deformity just below the head of the left tibia.

FIG. 9. Skiagram, with right and left reversed, after correction at the apex of the deformity in the tibia at letter A, showing the condyles of both legs to be practically normal.

FIG. 10. The same case six weeks after correction,

five hundred cases without a single abrasion, delayed union, or other unsatisfactory result, would seem to prove that rapid osteoclasis is a safe and certain operation for the correction of genu varum and genu valgum, and that it is free from complications.

In conclusion, skiagraphic observation seems to prove that the deformity of knock-knee and bow-leg is seldom, if ever, central in either the condyles or the joint.

I feel constrained to say that epiphysiolysis is hardly worthy of serious consideration, when compared with either osteotomy or osteoclasis, that osteotomy has some slight dangers from which osteoclasis is free, and the comparatively prolonged time taken for bone union and recovery should condemn it when osteoclasis is available.

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DISCUSSION.

Dr. **AUGUSTUS THORNDIKE**, of Boston, said he had been very much impressed with this device of Dr. Taylor's, for it seemed to more nearly imitate the production of a fracture by natural processes than any other osteoclast hitherto invented because of the rapidity with which it worked. The mechanism was worthy of great commendation.

Dr. **JOHN RIDLON**, of Chicago, said that this apparatus of Dr. Taylor was a beautiful apparatus. He had used his own instrument, modelled after this plan, and had torn the flesh of the limbs in two instances, and he no longer employed it. He would criticise the apparatus presented by his own experience. The leg pieces in that apparatus were covered with thick rubber tubing such as was found under elliptical springs in heavy wagons, and he was sure that the padding in this apparatus presented, as in his own apparatus, would cause the skin to catch and not slip on the hooks, and this, he was sure, was the cause of the tearing of the skin. The hooks should be of polished metal, and round, as in the Grattan osteoclast. In several hundred operations done by Dr. Blanchard and himself under such conditions the skin had not torn. He also believed that the round or elliptical bearing pad would break the bone more easily and certainly at the desired point than the flat breaking pad. The apparatus presented was certainly ingenious and much less expensive than the Grattan osteoclast.

Dr. **Henry Ling Taylor**, of New York, said he had been very much impressed with both papers. The first paper was an exceedingly valuable contribution to the subject. The idea of breaking the bones below the knee for knock-knee was new to him, and he was not aware that this had been done except in special cases: hence this point was certainly one of great importance. If the cases all resulted as well as those cited, it would seem that a great advance had been made. The osteoclast which he used was the Grattan instrument modified by Drs. Phelps and Weigel, and with it he had found it rather difficult to produce the fracture in close proximity to the joint. In little children the fracture usually occurred not far from the centre of the tibia: fortunately, this point of fracture seemed to afford sufficient compensation in most cases. Another point of some importance in the correction of bow-legs was the inversion of the foot occurring in nearly all these cases. Apparently, it was due to a rotation or twist in the shaft of the tibia, which was usually overlooked in operating. The tibia was ordinarily straightened and put up with the curve straightened, but with this twist unstraightened. Such cases recovered with the bow-legs cured, but with the feet turning quite markedly. In operating, one should take pains to manipulate the fragments until quite free, and then give the lower fragment a strong outward twist. He had adopted this plan in the past year or two, and with better results. There was another reason for doing this; *i.e.*, that with the outturning foot the strain was in the proper direction to prevent recurrence of the deformity. The osteoclast shown seemed to him an exceedingly workmanlike instrument, but he agreed with the criticism that the hooks would probably work better without padding. If it did better work than the improved Grattan osteoclast, it would be a remarkably fine instrument.

Dr. **W. R. Townsend** said he had had the pleasure of seeing this new instrument work, and it certainly did the work quickly, accurately, and efficiently. The suggestion made by Dr. Ridlon was a good one, for he had noted a slight catching of the skin. This instrument, when perfected, might take the place of the heavy and more expensive instrument of Grattan, with which there was always some difficulty in releasing the screw with sufficient rapidity.

Dr. **H. A. Wilson** said he would like to ask if Dr. Blanchard had used the osteoclast in bending the bones in their entirety in addition to the production of the fracture in the extremities; in other words, whether both processes had been used in the same patient. In the first skiagram with the long curve he thought a good deal could be gained by bending the entire bone first, and then producing a fracture. With reference to the various forms of appliances for the production of fractures without cutting, he had a distinct recollection of having seen the skilful production of fractures by hand manipulation alone by Dr. Townsend, which had demonstrated to him the advantage of a very rapidly working instrument. The Grattan osteoclast seemed to him hardly rapid enough in its action. It looked as if this new instrument of Dr. Blanchard would be an improvement in this particular.

Dr. **BLANCHARD** said, in reply to Dr. Wilson, that in the work done in Chicago by Dr. Ridlon, this had been done in the Home for Crippled Children. Many cases that seemed to be impossible of treatment by hand had been very successfully treated by Dr. Ridlon by hand manipulation. It could be done by one with sufficient muscular power. Frequently in cases on which they started to do osteoclasis it was found that the bones would bend quite easily, and that this bend could be distributed throughout the entire shaft of the bone. The limb could then be put up in plaster of Paris with perfect result. Frequently, however, in cases of knock-knee the fracture of the Grattan osteoclast occurred exactly at the desired point. If one resistance bar were nearly opposite the pressure bar, and the other considerably removed therefrom, the instrument would work very accurately. It seemed to him that one objection to the new Taylor osteoclast was that the leg supports would tend to spring outward and so favor the laceration of the soft parts. The conception of the instrument was excellent; but he would suggest replacing these spring resistance bars by very heavy bars, also the removal of all padding.

Dr. **R. TUNSTALL TAYLOR** thought all the members must feel very grateful to Dr. Blanchard for his study in this field. The idea of having the leather padding sliding on the resistance bars was that, if the leather adhered to the skin, the two would move together on the bars and so obviate any tearing of the skin, but the instrument was practically as safe without it. The apparatus could all be taken apart and packed flat in a dress-suit case. For knock-knee two resistance bars could be placed on one side.

VI.

THE OCCURRENCE OF PAINFUL AFFECTIONS OF THE FEET AMONG TRAINED NURSES.

A Series of 500 Observations upon Normal and Disabled Feet.

ROBERT W. LOVETT, M.D., OF BOSTON.

The liability of trained nurses to develop some static trouble with their feet during their hospital service is well known. In large hospitals it becomes a matter of economy to limit this so far as possible, and the following investigation was undertaken by me in a large general hospital in the hope of diminishing the trouble by seeing that all nurses wore during their course of training a proper boot, and were placed, so far as possible, under conditions favorable for their feet. With this in view, every nurse entering the hospital was examined soon after entrance, boots of a suitable shape were prescribed, and, if trouble with the feet arose during the course, she was seen and prescribed for.

The number of nurses observed having reached 500 in the course of some eight years, it has seemed worth while to analyze the records of these observations. In addition to any information to be derived about the etiology of this acute form of static trouble of the foot, there are certain questions of specific interest to hospital superintendents, police commissioners, and civil service examiners, which might well be elucidated by this mass of material. These questions are in part as follows:—

1. Can it be told by examination whether the feet of an individual are likely to break down or not under the strain of constant use?
2. What are the factors in causing this breaking down?
3. What is the nature of the process giving rise to the painful condition?

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11–14, 1903.

4. How much may be done toward preventing it by the use of proper boots?

The material at my command consisted entirely of young women between the ages of twenty-three and thirty-five. They were presumably healthy, having been selected from a large number of applicants who had answered a number of questions with regard to their general health when they filed their applications for admission to the school. The majority of them had previously earned their own living, having been school-teachers, housekeepers, nurses or attendants in other institutions, stenographers, and the like. Many had, however, lived at home, with no occupation.

During one period of a few months the nurses were not examined at entrance, but were fitted to regulation boots in a routine way, and only seen by me if they had trouble. But under these circumstances the percentage of trouble was higher than when they were examined at entrance and prescribed for individually, and that method was abandoned. With the exception of this time, during which no records were kept, and of another period of a few months when the work was undertaken by a substitute, the 500 nurses have all been seen by me and prescribed for individually, and the series of observations is continuous.

The conditions of their life in the hospital are of importance. The probationary period is two months, the course itself two years. The nurses on the average work nine and a quarter hours, with two hours off during the day. They do not live in the hospital building, but in a modern, well-ventilated dormitory near the hospital. There are now about 150 nurses in the school, but when the inquiry was begun the school contained only about 115. There have, therefore, been under my observation for eight years, at all times, from 115 to 150 young women living under conditions entailing great strain on the feet. Having records of all these cases along with careful notes of the nurse's condition at entrance, I have been in a position to estimate the value of certain things observed in the feet at entrance, and also the chance of familiarizing

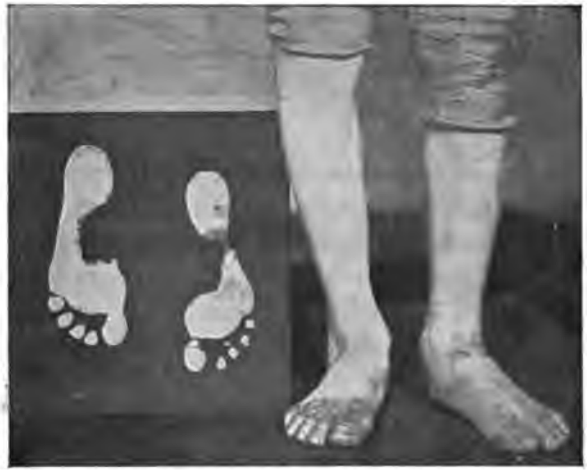

Fig. 1. Pronated foot without breaking down of the arch. See tracing.

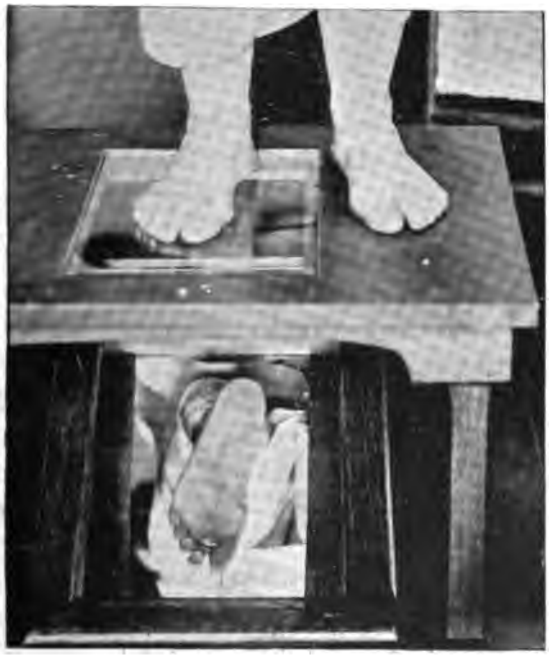

Fig. 2. Patient standing on glass table with a mirror underneath. On the mirror is seen the weight-bearing surface of the foot.

myself with the ordinary type of trouble as it occurs in these nurses, of studying its character and progress, and of attempting to shorten its course.

Method of Examination.—Imprint tracings were first used by having the nurse step on smoked paper, but after 130 of these observations it became evident that they were practically worthless. An imprint of this sort is a composite record of two positions. The foot first touches the paper and records the non-weight-bearing imprint, and then the imprint of the weighted foot. The two are merged, and a foot, which in use really rests upon two points of pressure only, the ball of the foot and the heel, gives a mark as if the outer border touched also. This outer border touches at first, then lifts under weight (Fig. 1). The imprints not only gave no reliable information as to the durability of an individual foot, but, when studied, showed in most cases that they were made up of two superimposed impressions, and must be misleading. The method was therefore abandoned.

A plate of glass with a mirror placed at an angle underneath was from that time used in all examinations. The nurse was examined with her feet bare, facing the observer, on a glass plate raised 18 inches from the floor (Fig. 2). In her natural standing position the anemic weight-bearing surface of the feet was observed through the glass, being reflected in the mirror. The pressure surface was recorded by a pencil sketch in the record. These contact surfaces followed the same three types shown in the figures of the smoked tracings (Figs. 3, 4, and 5). By inspection of the feet from in front the degree of rolling in (pronation) of the foot was next noted and recorded as the nurse stood in a natural position. The condition of the circulation of the feet was noted in many cases, whether congested with distended veins or not. Calluses, bunions, crumpled toes, ingrowing nails, and other signs of abuse were noted. Finally, the general appearance of the foot and an estimate of its probable usefulness was recorded as excellent, good, fair, suspicious, or poor. Each nurse was then given a note to a retail shoe store with suggestions as

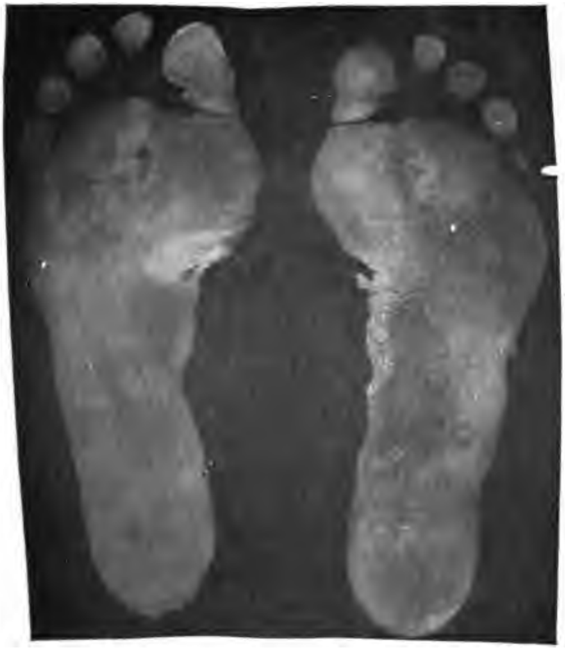

FIG. 3. Tracing of a flat foot. No symptoms, foot useful.

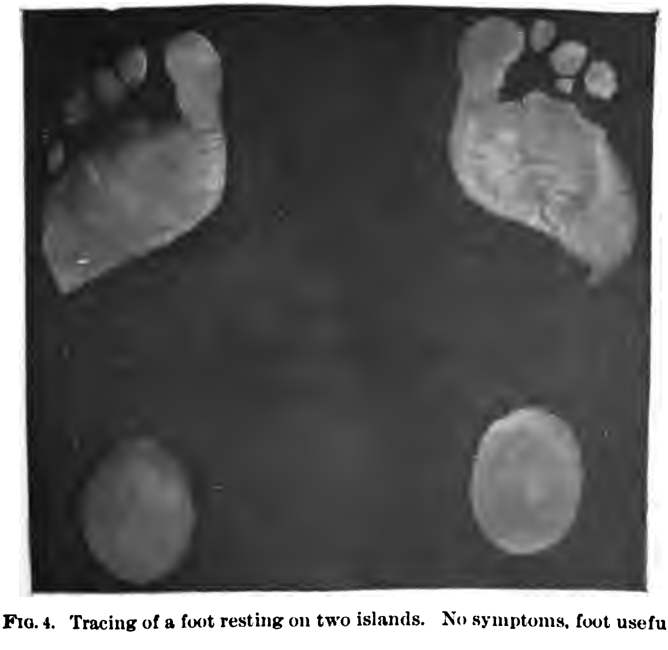

FIG. 4. Tracing of a foot resting on two islands. No symptoms, foot useful.

to any modification required in fitting her to the regulation boot.

Value of the Examination in determining the Durability of the Feet of an Individual.—In forming the opinion expressed in the terms "excellent," "good," "fair," etc., I was guided by the general appearance of the foot, chiefly whether or not

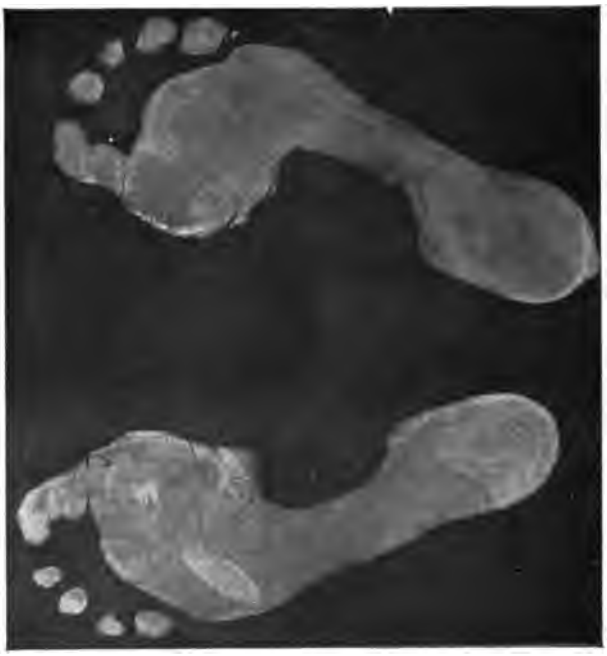

FIG. 5. **Type of tracing described as normal, with outer border touching ground.**

it was pronated much, the condition of the circulation, the degree of flexibility to dorsal flexion in passive manipulation, and the nurse's previous history.

In analyzing the records, I took the consecutive histories of a certain number of nurses who had during their course trouble of enough importance to lead them to complain, and of a similar number of nurses who had no trouble, and compared the later histories of the nurses of the two groups. The figures are given in percentages:—

	Nurses having trouble.		Nurses having no trouble.	
Excellent	12%	60%	6%	62%
Good	28%		26%	
Fair	20%		30%	
Questionable	12%	40%	12%	38%
Poor	10%		10%	
Not classed	18%		16%	

It will be seen that my opinion of the usefulness of the foot formed in this way was of no practical value in selecting the cases likely to give trouble. To reject applicants on an opinion formed by inspection would be unsafe. There have been five or six nurses with perfectly flat feet to go through the school without any trouble. There have been many nurses with the most unstable and threatening feet, which were badly pronated and bore heavily on the inner side of the ball of the foot and on the heel, who have gone through the school without discomfort, whereas nurses with feet in perfect relation to the leg according to all accepted ideas have been speedily incapacitated.

Weight and Size of Boot.—A series of 60 observations were made as to the relative weight of the nurse and the size of boot worn, to see if the relatively small feet were the troublesome ones. The nurse was asked in each case what her weight was, and what was the size of her boot. Of the nurses having trouble, the average weight was 132 pounds and the average boot No. 5. Of the nurses having no trouble, the average weight was 131 pounds and the average boot No. 5. It was evident that no information was to be obtained from this line of inquiry.

Pronation.—The amount of pronation or rolling in of the foot was investigated (Fig. 6). It is generally assumed that, although a certain amount of pronation is normal in weight-bearing, more than a moderate amount is an evidence of weakness in the foot and predisposes to breaking down. The figures to be quoted do not bear out the opinion that decidedly pronated feet are necessarily likely to break down under strain.

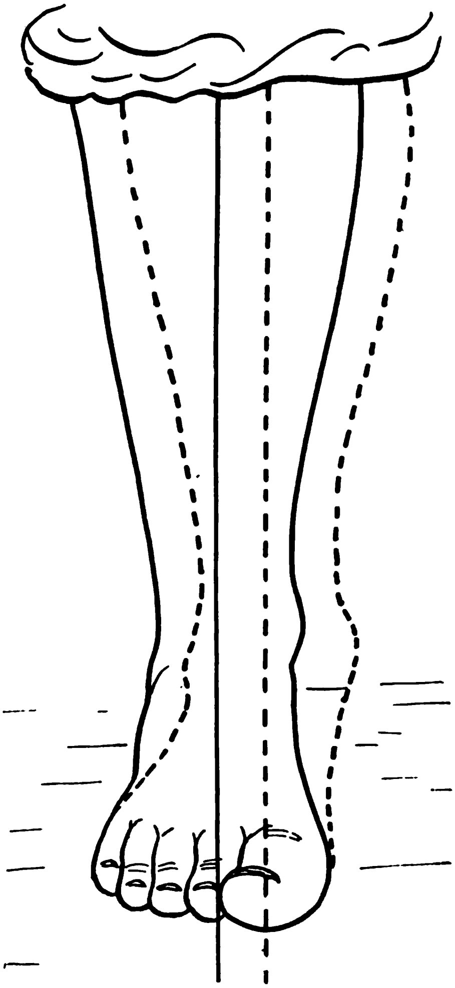

FIG. 6. Normal and pronated position of the foot, the latter in dotted outline.

This fact explains in a measure the foregoing statement that the estimate formed by inspection was of little value; for, influenced by general opinion, I was led to regard pronation as the most important factor in forming my opinion. The estimate of pronation was made by the eye, and was recorded when the nurse was first seen.

The table consists of the consecutive records of 185 nurses analyzed later to see what proportion of nurses who had trouble and who had no trouble had pronated feet when they entered.

In a general way the percentage of trouble was slightly higher when much pronation was present (23 per cent. as contrasted with 17 per cent.), and slightly lower when there was little or no tendency to pronation (40 per cent. as contrasted to 43 per cent.). But such a slight difference shows that the degree of pronation or "weak foot" is of little practical value in forming an estimate of the usefulness of an individual foot.

	Nurses without trouble.		Nurses with trouble.	
Pronation marked	13%	17%	18%	23%
Pronation more than average . . .	4%		5%	
Pronation average or moderate . .	30%		26%	
Pronation slight	17%	43%	20%	40%
Pronation very slight	10%		10%	
No pronation	16%		10%	
Not noted	6%		7.5%	
Feet flat	1.2%		. . . .	

Pressure Areas on Glass.—The only sign observed at the first examination that seemed to be of prognostic value was the imprint of the nurses' weight-bearing foot as observed through the glass plate. The nurses showed three types of pressure areas: (*a*) when the foot rested on two islands, one under the heel and one under the ball of the toe, while the outer border did not bear weight (this type was classed as "two islands"); (*b*) when the outer border bore weight as well as the heel and front of the foot; (*c*) when the foot was more or less flattened and the outer border was very broad.

150 nurses were classed as follows:—

	Both feet "two islands."	One foot "two islands." One foot outer border bearing weight.	Both feet outer border bearing weight.	Both feet flat.
Nurses having trouble . . .	58%	18%	18%	6%
Nurses having no trouble .	42%	15%	38%	2%

It will be seen that nurses whose feet bear weight along the outer border are less likely to have trouble than when the weight rests on two pressure islands.

Flexibility of the Foot, Circulation, etc.—The degree of flexibility of the foot in passive dorsal flexion proved not to be a sign of prognostic value, nor did disturbance of circulation in the foot, as shown by congestion and distention of the veins at the first examination, signify anything of importance, as at the beginning of the training such a disturbance was common.

The index of pronation of the foot, as measured by an instrument devised by Dr. F. J. Cotton and myself, did not prove of the value that we had hoped[*] (Fig. 7).

In 21 cases measured by this instrument the index averaged as follows:—

Nurses without trouble	Right foot supinated.	60 L.	P. 61.
	Right foot pronated.	63 L.	P. 65.
Nurses with trouble	Right foot supinated.	58 L.	P. 61.
	Right foot pronated.	62 L.	P. 65.

Much to my regret, therefore, I am obliged to record the fact that the original examination has proved of little value, so far as it indicates whether the feet of an individual nurse are likely or not to give trouble under the severe strain of use. The only point to which much importance can be attached is the character of the imprint on glass. The examination, however, is, I believe, of great value in suggesting precautions which may be taken which will be spoken of later.

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[*] Lovett and Cotton, "Some Practical Points in Anatomy of the Foot," Boston *Medical and Surgical Journal*, August 4, 1898.

Nature of Process.—The character of the disturbance when it occurred was next investigated.

Symptoms were of a pretty uniform character. Burning and a full feeling in the feet were succeeded by lameness and stiffness. Swelling of the feet and some restriction of the normal motion followed in the severer cases. These symptoms in favorable cases under proper treatment improved and disappeared. In certain cases, however, in spite of proper support, massage, douches, etc., these increased until the nurse was incapacitated from work for a few days. Tenderness appeared in nearly all these cases, either under the scaphoid or under the bottom of the heel, rarely in the great-toe joint. Pain in the knees and back were not uncommon symptoms. Rare symptoms were synovitis of the tendo Achillis, and only in one or two cases was there complaint of pain in the front of the foot, and these seemed to be traumatic.

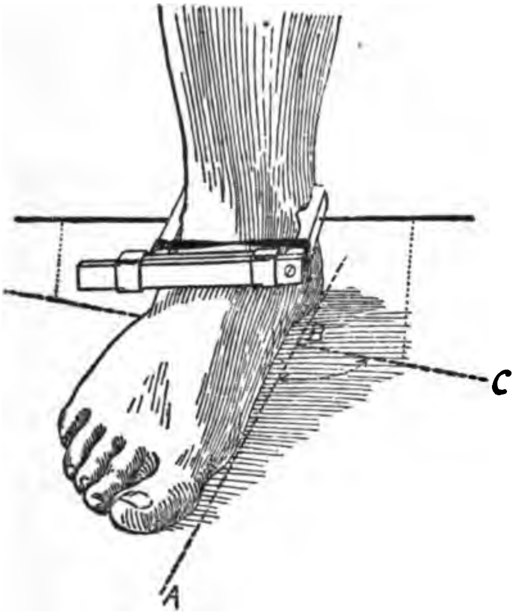

Fig. 7. Apparatus for estimating index of pronation. The angle to be measured is A, B, C.

Change in Imprint.—The essential character of the static change causing the trouble was investigated and proved to be a moving inward of the bearing surfaces as seen through the glass, in a few cases observed no change had occurred, and the imprint was the same as at entrance. It seemed generally as if the muscles relaxed and allowed the foot to roll in. *Real breaking down of the arch of the foot in nurses having trouble was not observed in any case.*

Season of Year.—It became evident that nurses were more liable to have trouble at certain seasons than at others. The cases classified by months are as follows:—

January	8% of all cases.		July	4% of all cases.
February	14% " "	64%	August	2% " "
March	24% " "		September	0% " "
April	10% " "		October	0% " "
May	16% " "		November	8% " "
June	6% " "		December	6% " "

64% of all cases occurring in February, March, April, and May.

Time at which Trouble occurs.—Inquiry as to the period of the nurses' training at which trouble began gave the following result:—

At once	2%	Four months	6%
One month	16%	Six months	6%
Six weeks	4%	Nine months	2%
Two months	20%	Twelve months	2%
Ten weeks	12%	Twenty-four months	4%
Three months	28%		

It will be seen that 60 per cent. of all cases of trouble occurred in from two to three months after entry. As the nurses are admitted more or less equally through the year, it will be seen that there is another etiologic factor beside the seasonal one just mentioned.

Conditions preceding the Trouble.—In nearly half of the cases no definite cause could be assigned for the trouble. The abnormal conditions preceding the trouble mentioned in the order of frequency were as follows: tonsillitis or diphtheria, rheumatism, change in work, improper boots, confinement to bed, excessive heat, neurasthenia, trauma, amenorrhœa. Nurses seemed inclined to experience their first trouble during menstruation rather than between the periods.

The relation to rheumatism seemed of much interest. Three or four perfectly typical cases of trouble in the feet occurred in nurses previously free from rheumatism. These cases all proved resistant to ordinary supporting treatment, but in a few days developed signs of general rheumatism. No diagnosis of rheumatism was made in this connection unless the symptoms appeared in the upper extremity, as in the hips or knees they might have been purely irritative and due to the abnormal use of the foot. There was nothing to distinguish them from the ordinary painful affection in the beginning, but in their later course they proved obstinate and long continued. Such patients required support to the arch as much as if the affection were purely static, and derived as much comfort from it.

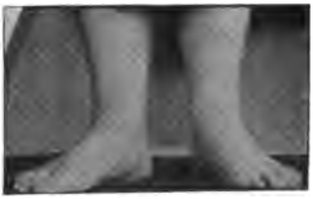

Fig. 8. Photograph of a nurse who broke down after three months, and who has been incapacitated from work for two months. In this case the foot appeared to be so good that the regulation boot was not ordered (*American Medicine*).

Another point of interest is that when trouble with the feet occurred during a long period of amenorrhœa it was apt to be most troublesome. In one nurse in a period of severe discomfort, during which she was barely able to get about the ward, menstruation came on, and the trouble at once improved.

Period of Disability.—When it became necessary to take a nurse off duty, it was not done, of course, until it seemed that she would not recover by the use of a proper support while at her work. The period of disability lasted in most cases from two to three weeks. It always seemed at the beginning as if it would be less, but continued experience showed that, if a nurse had once experienced severe trouble, it was wiser to keep her off duty until the tenderness in the foot had practically disappeared.

No statistical inquiry has been attempted as to the number of nurses having trouble or incapacitated each year, as it would have involved much more labor than it would have been worth. The causes of removing a nurse from duty are often complicated, and any such inquiry would have necessitated a search into the nurses' record in each case as well as into my own records. A fair statement of the case would be that for the last five years some nurses have each year been incapacitated from duty. During these years in a few cases nurses have left the school on account of continued or recurring disability in their feet.

The evidence so far adduced points rather to the general condition of the nurse than to the especial structure of her feet as the cause of the trouble. They have trouble in the spring when they have been housed all winter and when the work in the hospital is hardest. This trouble is more likely to come between the second and third month of their course than at any other time, when the novelty of the situation has worn off, and the fatigue of the routine begins to be felt. The trouble is likely to follow diseases which debilitate the muscles.

Boots.—It is a matter that would be admitted without discussion that, if a person is to undergo a severe test to the foot in the matter of standing, a good boot is better than a bad one. The chances of enduring the strain successfully would be diminished by wearing a tight boot with a pointed toe, a high heel, and a slender flexible shank.

At the time that these observations were begun there was no ready-made boot for women in the market worthy of serious consideration. It was, therefore, necessary to have one constructed on new lines, and in the boot devised and used since that time the following points were aimed at: (1) The boot should be as wide as the foot in front. (2) The inner edge of the front of the boot should be nearly straight, so as not to displace the great toe outward. (3) The boot should be constructed on a slightly curved line, the convexity being outward so as to hold the foot in its position of strength. (4) The shank should be fairly high and slightly stiff.

These propositions were submitted to a firm of shoe dealers, and a last made on these lines. This boot has been used by these nurses, and has not been radically changed. At first it was made a little too much curved, and was apt to cause corns on the little toe. At one time the shank was made stiffer, but shortly after this there was a good deal of trouble among the nurses, and I returned to the original shank. But this outbreak of trouble was coincident with increased duty on account of the admission of soldiers returning from the Spanish War, and was probably due to that. The boot is not ideal, and may not be the best for the purpose, yet I have felt that experiments were risky, and that I had at least a fair boot, the working of which I understood. My aim, in short, has been not to cramp the foot in front, to support the arch underneath, and to hold the foot slightly curved.

The difficulties have been to get the shoe dealers and the nurse to agree on a boot sufficiently wide in front, and to get the manufacturer to make the last deep enough where the upper of the foot joins the vamp in front. The transverse seam below the lacings has been on the whole too tight and a source of much trouble. If it is made too loose, the front of the boot wrinkles, and the regulation boot and most others are too shallow where the upper joins the vamp in front. In each case the nurse has been given a letter stating her requirements, and the instructions to the dealer have been that, if she could not be fitted properly, she must have a boot made on the same general lines, but suiting her especial requirements. In perhaps 250 nurses the boots were inspected before being worn, but the system was abandoned on account of certain practical difficulties, and since then the nurses' instructions have been to report if the boot was not comfortable. Lace

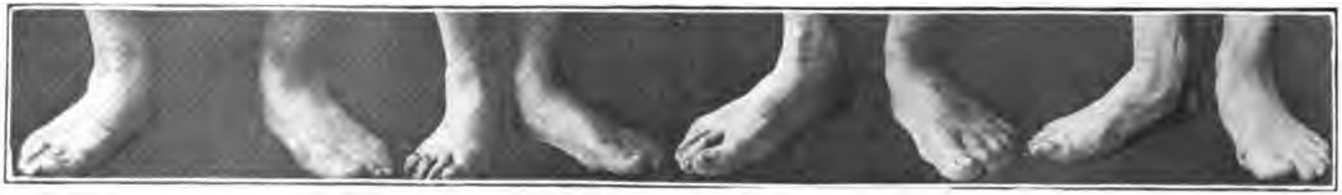

Fig. 9. Four nurses with flattened or pronated feet, who after months of service had been comfortable. These were classed as "suspicious," at entrance (*American Medicine*).

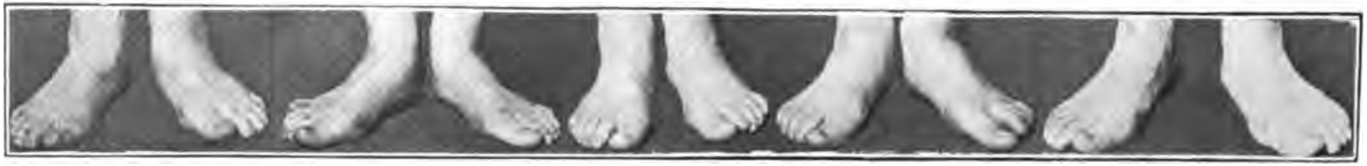

Fig. 10. Photographs of the standing position in five consecutive probationers at admission. These were taken to show the average foot, and in no one of the cases had there been any trouble (*American Medicine*).

boots are ordered with rubber heels, and low shoes are not allowed except by special permission in selected cases. The boots are made of kid, with a sole of medium thickness. The shank is stiffened by a light piece of spring steel, and the heel is of medium height.

In 130 nurses I made outline tracings of the foot and of the boot worn at entrance, and in practically all cases the result showed a gross disproportion between the size of the boot and the foot. Of later years the style of boot worn at entrance has improved, and there are now in the market several styles of cheap boots which conform fairly well to the theoretic requirements. At one time when a nurse came to the hospital wearing a good boot which seemed to meet the requirements, I did not order regulation boots, but allowed her to wear what she had. But the experience was not favorable to the method, and the proportion of trouble in such nurses was unduly large, and now the regulation boot is prescribed except in very exceptional circumstances.

It is a very common experience to have the slight trouble which very often occurs in the first days of duty immediately relieved on putting on the regulation boot. The outcome of my experience has been that I believe that a good boot diminishes trouble, but cannot prevent it, and that, if nurses were allowed to wear boots of their own selection, there would be much more trouble than there is now; that, as the cause of the trouble seems most often to be found in muscular relaxation due to fatigue and similar causes, the problem is so far as possible to supplement the action of the muscles in holding the foot in its supported position.

Prevention of Trouble.—At the first examination, if the nurse's boot was trodden over to the inside, or if much pronation was present, the inner side of the sole and heel was made one-eighth inch or even one-fourth inch thicker than the outer side in order to tip the foot over onto its outer border somewhat.

Continued experience has not shown that this is a measure of much value, and its preventive effect was small, and in the last year or two it has been used much less than at first. If the nurse's foot showed a very high arch, an order was given for a boot with an extra high shank. In some of these cases a cork pad was put in at the beginning to support the high arch. In a few cases of very severe pronation, and in one case of traumatic flat foot, metal supports have been put in when the nurse was first seen, with apparent prevention of trouble.

Treatment.—Every nurse has been asked to report at once any discomfort in the feet, but the disposition has been to put off "making any fuss" until the condition had existed some days at least.

In the milder cases the aim of the treatment has been to relieve the muscles from strain and to stimulate the circulation. Felt pads have at once been put in the boots to support the arch, and the nurse has been ordered to soak the feet in hot water at night for ten minutes, and then to shower the feet with cold water, and to bandage the feet and legs with flannel for the night. The majority of early cases have, I think, yielded to this treatment. If, however, rapid improvement has not come on in two or three days, or, if the first symptoms have been severe, a metal support to the arch of the foot has at once been put in and measures to stimulate the circulation have been used, as described above. In some cases plates have relieved the symptoms at once, and have been worn for a few weeks or months, generally to be given up later.

In the severest cases all sorts of expedients have been tried to cure the pain while the nurse continued her work. The most efficient support of all is to apply a felt pad to the instep while the foot is held inverted by fastening the pad to the bare foot by several straps of adhesive plaster which pass from the outer border of the foot under the foot and up under the inner side of the arch over the top of the foot to the ankle. These straps overlie each other, and are covered by a heavy cotton bandage. This dressing must be renewed every day or two. This dressing, which is distinctly more supporting than any metal plate, has in some cases carried nurses over a painful attack while on duty, but more often it has failed in the severest cases. In these severest cases hot air baths, massage, and stretching of the calf muscles have been faithfully tried with no brilliant success. They have helped the condition, but I cannot recall a severe case in which any one of these latter measures has made any serious difference.

If a proper fitting metal plate fails to relieve symptoms within two or three days, the sooner the nurse is laid off, the better, and the shorter her period of incapacity. When she is laid off, she is not allowed to walk; but, as she convalesces, she is encouraged to take out-of-door walks, and is not regarded as fit for duty until she can walk a mile or two on brick sidewalks without pain. Several times it has been demonstrated that it was unwise to allow nurses to go on duty under other conditions. Strychnine in fairly large doses has been used in a number of cases in the hope of improving the muscular tone when trouble was threatening, but I have failed to see striking instances of its benefit.

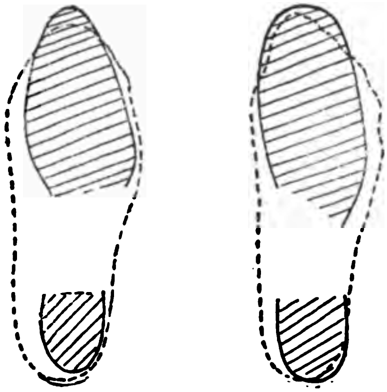

FIG. 11. Feet and boots, typical tracings. The boots are shaded.

In no case can I recall that a metal plate has been otherwise than helpful. It is often not enough to prevent laying off of the nurse, for the traumatism of constant walking and standing is too great for it to overcome, but as a preventive it is of great value and a great aid in protecting from strain convalescents from foot trouble. A few nurses have continued to wear plates throughout their course, but the majority have dispensed with them after a while.

A summary of this paper can perhaps best serve its purpose by attempting to answer the questions proposed at its beginning:—

1. It has not been possible to tell with any certainty by examination whether or not the feet of an individual are likely to give trouble. The only reliable information obtained in these cases was given by the imprints seen through glass. A foot with a well-distributed pressure area seemed rather less likely to give trouble than one resting on two islands, the degree of pronation, the condition of the circulation, the relative weight of the nurse, and the dorsal flexibility of the foot all proving of little or no value as elements in prognosis. A flat foot may be perfectly serviceable, as may also a severely pronated one, while an apparently well-balanced foot may become painful.

2. The factors in causing the trouble among the nurses were to be sought rather in the general conditions than in any especial conformation of the foot. It followed in many cases illness and other conditions causing muscular debility. It occurred in most cases from two to three months after entrance, and it began most often in the early spring when the nurses had been indoors all winter, and least often in the fall.

3. The trouble was caused by a rolling in of the foot and a shifting inward of its weight-bearing areas, and not in any case observed by a breaking down or even lowering of the arch.

4. Although proof by figures is lacking, it is probable that the amount of trouble has been decidedly less than it would have been without the use of a proper boot.

VII.

A FURTHER CONSIDERATION OF A MODIFIED FORM OF OSTEOTOMY COMBINED WITH OSTEOCLASIS, —OSTEOTOMOCLASIS.

W. BARTON HOPKINS, M.D., PHILADELPHIA.

The subject of this brief communication may best be described by referring to a preliminary note read before the Philadelphia Academy of Surgery five years ago.

As indicated by the name suggested, osteotomoclasis, the operation to be described consists of combining in a modified form both the operations of osteotomy and osteoclasis to correct a curve or bend of a long bone resulting from congenital malformation, rickets, or vicious union after fracture. Briefly stated, two operations are done, incomplete osteotomy and osteoclasis. At the first operation the bone is divided with a chisel not completely, but through more than one-half of its thickness at its inner curve. After the skin wound has healed, but before repair of the bone has sufficiently advanced to restore the original strength at the weakened point, a period easily included between one and three weeks, the osteoclast is applied, and the deformity corrected by a fracture in the bone at its weak point.

In studying the action of the osteoclast some familiarly known principles relating to the strength of bodies and their resistance to force may be referred to. Letting a square beam of wood represent the shaft of a bone, discounting for the time the variations in form which modify its strength, the manner in which an osteoclast exerts its force would test the transverse strength of such a beam. The transverse strength of a beam is represented by two elements, its resistance to compression of one-third of its thickness and its resistance to extension of the remaining two-thirds, the line of equilibrium at which compression terminates and extension begins being the neutral

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axis. "The limit of stiffness is flexure, and the limit of strength or resistance is fracture." The limit of stiffness is more easily reached than the limit of strength. If, therefore, a transverse cut is made in the beam on the side to be stretched, the latter will be weakened relatively more than by a similar cut made on the side to be compressed. The side to be stretched or extended will be fractured, whether a cut is made or not, the continuity of the beam being preserved, if at all, at that portion which is only flexed, not broken. What is true of a beam of wood is, so far as present purposes are concerned, equally true of the shaft of a bone. Partial section, therefore, as described, would seem to be a rational preliminary step to osteoclasis by reducing many times the force required by the latter and by locating accurately the point of fracture. The use of the osteoclast to supplement the work of the chisel, where, as in hospitals, this rather cumbersome apparatus is available, is, for reasons presently to be mentioned, advantageous. Whether in certain cases osteotomy may be made a safer operation by combining with it osteoclasis as a subsequent step is a question which can only be decided by experience. In children so poorly nourished and unhealthy that traumatism of any kind is likely to provoke suppuration, the danger of a bone section cannot be ignored. It is in cases, therefore, whose general condition in prudent hands negatives the performance of osteotomy that I venture to propose the modification of the latter I have suggested, as for them I believe it would prove safer. Osteoclasis, although having fallen to a great extent into disuse, is especially useful for correcting trifling curves in tender bones in children whose parents cannot go to the expense and trouble of apparatus necessary for a cure by gradual means. Intelligently employed, it is neither haphazard nor barbarous, and should not, in my opinion, be allowed to become an obsolete operation. But our subject relates to that class to which simple osteoclasis is inappropriate, either because the bone is too hard or the apex of deformity is too near a joint to yield to a degree of force which can without risk be applied: suitable cases, in other words, for osteotomy. Osteotomy causes a compound fracture, the modified method a simple fracture. Osteotomy produces usually a complete fracture, while by the modified method the fracture is usually incomplete. After osteotomy, fixation is required immediately. By the other method no fixation is required during the existence of a wound. When suppuration occurs after osteotomy (which, however, it rarely does), it is complicated with loss of continuity in the bone,—a suppurating compound fracture. Should suppuration occur after the first step in osteotomoclasis, it would involve only a bone cut, not a bone section, and would be surgically far less serious than if accompanied by loss of continuity. Following the second step, after the skin wound has entirely healed, there is, of course, no risk of suppuration, as the fracture produced is a subcutaneous one. Osteotomy, on the other hand, requires only one etherization, while the modified method requires two. The osteoclast shown in Fig. 4 is the one which has been used in these cases. It is very simple, easily adjusted, and powerful, but is not particularly original. The two counter-plates and the C-shaped clamp can be placed at any point desired on the pair of shears, and retained by binding screws beneath. The apex plate is swivelled to the clamp screw. The pressure plates present concaved faces, and have flanges on their lateral borders to secure the necessary pads in position. It may be said of instrumental osteoclasis that it possesses the great advantage over what may be called manual osteoclasis, in that the force used with it is under perfect control, ceasing instantly the bone yields, producing thereby usually an incomplete or greenstick fracture, while the force applied by manual effort, on the contrary, cannot be so controlled, but goes on with a rush when the resistance of the bone ceases.

Little need be added to this note beyond the mere statement that the modified operation has been performed in most of the osteotomies I have done in order to demonstrate what advantages, if any, it had. It was done indiscriminately in healthy and in feeble children. I may therefore venture the opinion that, while osteotomy is almost invariably free from risk, we have in this modification a procedure occasionally applicable.

VIII.

A CONSIDERATION OF THE "ROUND SHOULDER" OR "STOOP SHOULDER" DEFORMITY IN CHILDHOOD, WITH ESPECIAL REFERENCE TO THE PROPER ADJUSTMENT OF THE CLOTHING IN PREVENTING AND TREATING SUCH CONDITIONS.

JOEL E. GOLDTHWAIT, M.D., BOSTON, MASS.

The frequency with which the "round shoulder" or "stoop shoulder" deformity is met in growing children, without other evidence of disease than the weakness of the posterior shoulder muscles, and the difficulty so often experienced in overcoming this defect, even under careful physical supervision, must have impressed all who are called upon to examine children, and naturally leads to reflection as to the cause of the trouble and its obstinacy under treatment.

The condition is seen more commonly with girls than with boys, and from three to four years of age on to puberty is the period during which the condition is most frequently seen. It is rarely noticed in infants or during the first two or three years of life, and it is a matter of considerable surprise to see children at this period with well-formed round chests and well-poised shoulders gradually develop this weakness as they become older.

With boys the condition is usually outgrown at or before the time of puberty. With girls this is less often the case, and the weakness of the scapula muscles remains to be seen not infrequently in adult life. The condition is naturally seen most often in poorly developed children, but it is also seen in those otherwise strong and well developed, the weakness of this one group of muscles being the only apparent defect.

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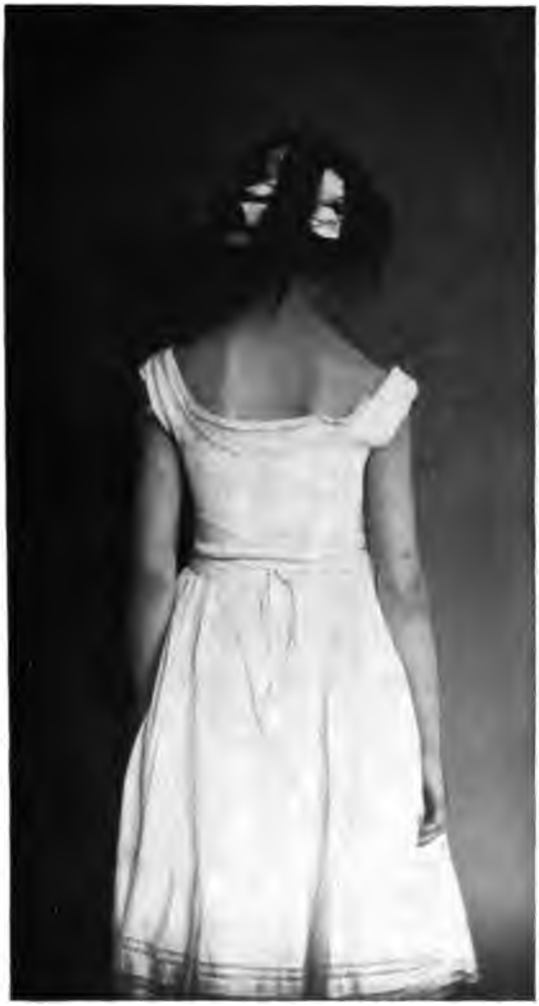

FIG. 1.

In considering the subject, and as the result of the examination of a large number of children, both in the hospital clinics and in private practice, it has seemed to me that the chief factor in the etiology of this condition is the improper adjustment of the clothing, especially as the condition develops as the simple clothing of infancy is discarded and the heavier and more complicated costume of the child is assumed. The opinion is strengthened by the fact that the condition so often corrects itself at the time of puberty, when the arrangement of the costume again changes, the shoulders at this period being depended upon less for the support.

In studying the costume of the young growing child more in detail, it will be seen that all of the heavier garments or those from which any drag could come, including the stocking supporters, are attached to the under-waist, and that this under-waist is carried entirely upon the shoulders. Of these under-waists there are many styles, some expensive and some very inexpensive, but practically all are so made that the weight is applied at the outer or movable portion of the shoulder, the position which is least capable of carrying weight. This is clearly shown with the resulting attitude in Fig. 1. Anatomically, the position of the shoulder is maintained by the clavicle, with its attachments in front and by the scapula muscles in the back. It is evident that anything that causes pressure or drag upon the outer or movable part increases this muscular action, and that, while in moderation the muscles may respond to the task, if the strain be continued during all of the active part of the day, muscle fatigue and later permanent weakness must result. In this condition the shoulder must be depressed or lowered, but from the bony clavicular attachment in front and the ribs supporting the shoulder below when it is depressed it must come forward, and, as it is drawn forward, the posterior edge of the scapula is thrown into greater prominence.

From actual measurements the drag upon the shoulders when the clothing is adjusted represents at least three or four pounds on each side, and, when it is realized that this is expected to be carried not for a few minutes, but for all of the day, the muscle fatigue with the ultimate muscle atrophy is not to be wondered at. If this be of the importance which it is considered by me, the fact that the treatment, without correcting this element, is tedious and often a disappointment is easily explained.

In considering the various waists which are commonly used, not only do they apply the support at the outer portion, that which is the least able to carry the load, but there is also in many of them a strap which draws from the outside of the shoulder to the median line in front, the effect being to draw the shoulder not only down, but also forward, thus making muscular resistance still more difficult.

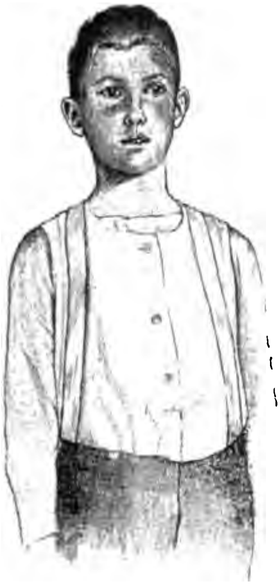

FIG. 2.

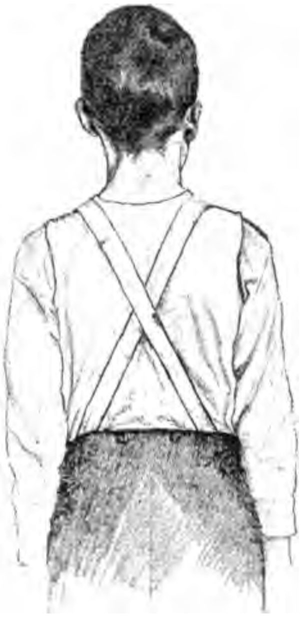

FIG. 3.

To correct the defects of the garment and to improve the anatomical condition, it has been my plan to apply the weight at the base of the neck, or the rigid part of the shoulder, where any amount can be borne without the shoulder being lowered. At the same time it has been a part of the plan to prevent the drag upon the front of the chest with the consequent flattening.

The waist which has been most satisfactory is pictured in Figs. 2 and 3. It is made of a firm cotton material, and is cut high in the neck with a rather narrow back, but with a loose, easy front. Two straps made of double thickness of the same cloth are sewed to the waist, and upon these the chief drag comes. The straps start well at the side in front, cross the shoulder near the base of the neck, and cross the back to the opposite hip. In this way the chest is left free, and whatever drag there may be tends to draw the shoulder backward

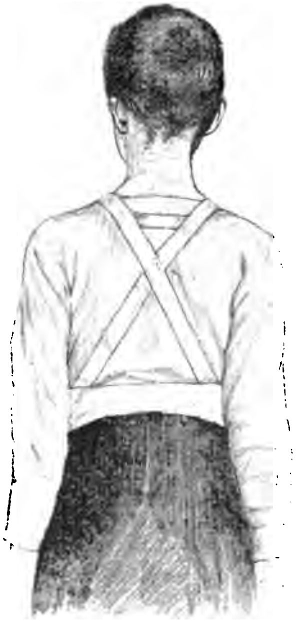

FIG. 4.

rather than forward. The stocking straps are attached with the side buttons for the clothing at the side just between the ends of the shoulder straps, so that the drag is applied most favorably. The stocking straps should never be attached in front, as this always produces muscle strain with resulting faulty attitudes.

For summer use a skeleton waist has been used, consisting of a wide band at the waist line for the attachment of the buttons, this being supported by straps placed similarly to the straps which are sewed to the other waist. This is pictured in Fig. 4, and the only difference in the arrangement of the straps is that a cross strap at the back near the neck is necessary to hold them sufficiently high upon the shoulders.

Occasionally, when the stoop shoulder is marked, some additional support may be necessary, and with many of the cases it

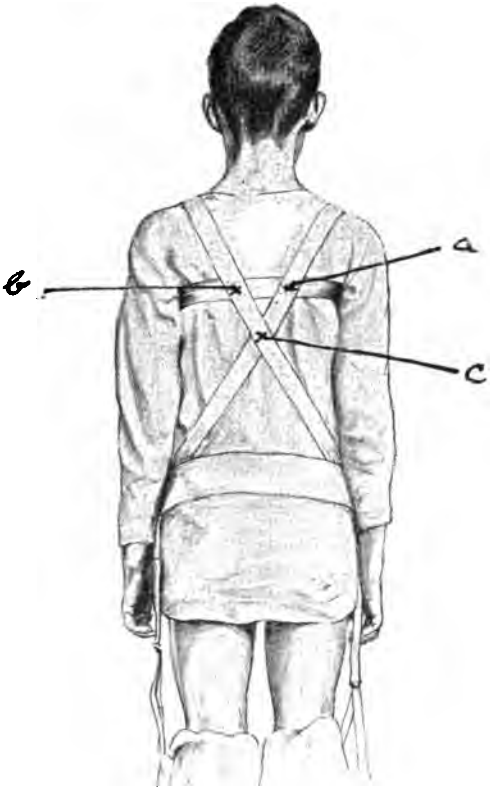

FIG. 5.

has been possible to accomplish the result by using a brace made of firm webbing one inch wide, carried as a loop around each shoulder, the ends crossing in the back, and being attached to the belt of an ordinary stocking supporter (Fig. 5). The attachment of the shoulder strap to the belt should be at the side directly over the stocking straps, and the belt should be worn about the hips, and not about the waist, as they are ordinarily used. The straps should be sewed where they cross at the back, a and b, Fig. 5, but should not be sewed where they cross at c. This allows all the body movements, both side and forward bendings, without straining upon the straps or changing the position of the belt, as is shown in Fig. 6, the level of the belt not being changed in the movement.

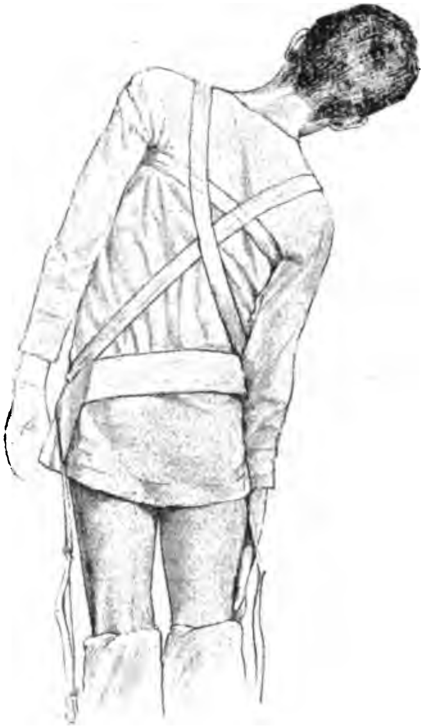

FIG. 6.

It is at once apparent that with such a brace the pull occasioned by the stocking supporters, which is a very appreciable force, tends constantly to draw the shoulders backward; and, while so simple a brace cannot be expected to take the place of the many forms of apparatus which are used to correct round shoulders, it has, nevertheless, been of real value in many cases.

IX.

THE ABUSE OF FLAT-FOOT SUPPORTS.

WISNER R. TOWNSEND, A.M., M.D.

The treatment of flat foot by means of some form of support under the foot is largely due to the excellent work of many men in this Association, and it seems proper, therefore, that the members of the American Orthopedic Association should call the attention of the profession to the abuse of such supports. The fact that such a question is difficult of solution, and that the motives prompting publicity are often purposely misunderstood, is no reason why we should hesitate to give the proper advice and urge upon medical men the necessity of properly examining and treating deformities or disabilities of the foot.

That the treatment of this condition without consulting a surgeon has become very common is evidenced by the fact that various forms of support are to-day for sale in all the larger stores where footwear can be bought, and the daily, weekly, and monthly lay press, in addition to the medical journals, contain many advertisements of plates, braces, springs, supports, etc., warranted to cure flat feet, perfect in fit, self-adjustable, and easily worn in any shoe.

The diagnosis of flat foot is, as a rule, not difficult, but that errors are quite common cannot be denied, and that even the most expert diagnosticians may at times be puzzled as to the true nature of a valgus deformity must also be admitted. A correct diagnosis is necessary before correct treatment can be instituted, and an error in diagnosis generally means improper treatment.

The most frequent errors in diagnosis are mistaking an ostitis of the tarsus or ankle, a metatarsalgia or neuritis, or an inflammatory rheumatic condition of the parts about the

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inner side of the foot, for a flat foot. Other errors, but less frequent, are the application of flat-foot supports for pain in the feet due to a cavus deformity, a periostitis of the os calcis, and to extreme grades of malposition after Pott's fractures. In one instance the writer knew of, a sarcoma of the sole of the foot was treated for some time by braces under the idea that the deformity, disability, and pain were due to a flat foot. Ostitis of the tarsus or ankle is not a rare affection, and the writer has seen many such cases treated for flat foot. The patient received no benefit from the support used, and in most instances was made much worse by the pressure and the traumatism of locomotion. A careful inspection of the foot, an X-ray picture, the atrophy of the calf, the presence of reflex muscular spasm, are usually sufficient to render a differential diagnosis easy to a medical practitioner, but the symptoms cannot be properly interpreted by those who have no medical knowledge, and all such cases must necessarily be treated badly if they simply buy supports under the idea that they have flat foot. In inflammatory rheumatism or neuritis the same is true, and many patients continue to suffer until proper treatment is given, and generally are made worse by the use of the support.

All the other conditions referred to have been seen, and the effort to increase an exaggerated arch, as in cavus, is not at all uncommon. The proper treatment of such cases is entirely different.

When flat foot does exist, it does not necessarily follow that a support must be applied, because there are contra-indications for their use. Extreme spasm, extreme deformity, or inflammatory conditions, may be present, and the use of a support do more harm than good. These contra-indications are well known to the profession, but not to those who simply buy supports as they would buy any article of clothing. Another damage resulting from the indiscriminate use of supports and their application to all cases, suitable and unsuitable, is that many mild in type and easily cured by medical men are allowed to grow worse under this faulty plan of treating a foot disability by those without medical knowledge. Patients with disability so slight that any medical man could easily cure it, if seen when the supports were applied, may go on and become so seriously crippled that long-continued treatment and even operative procedures may be necessary to restore the foot to the normal, and perfect restoration may even be impossible.

Another error of treatment, which is the one that especially deserves to be considered, is the application of supports that do not fit, that do not fulfil the indications for treatment, and that are so poorly constructed that even from the standpoint of their makers they in no sense of the word act as supports, because they are so frail or weak they can barely retain the position or shape they were made, and lose all semblance of it as soon as weight is put on. That supports which simply tend to push up a broken-down arch can never cure a flat foot is not disputed by medical men, but a support to hold up weight must be strong enough to maintain its shape under the weight, yet many patients are to-day wearing supports that do not support, and that are simply flat pieces of metal interposed between the sole of the foot and the shoe. In many cases the support is applied so far forward or so far back that it is of no assistance in preventing deformity, and more frequently tends to increase than to diminish it. Deformity may actually be produced and disability caused by the use of improper supports, and a flat foot produced where none existed when the use of the support was begun.

For the patient with a flat foot, who is his own surgeon or whose attention is called to the condition of his foot when purchasing shoes, there is but one kind of treatment,—the application of the support sold at that store. Of necessity many cases must be badly treated under these conditions. Many forms of supports exist, and no one can successfully treat the condition who has but one prescription for its cure. Different cases require different treatment, and this is the most important point in the discussion. The principles are not understood. The valgus or abduction of the foot must be overcome, the weakened structures must be strengthened, the free and normal motions of the foot must be restored, the deformity overcome, the patient made to walk as patients with normal feet should walk, and the application of a support simply intended to push up a weakened arch can never accomplish this. Temporary relief may be obtained, but never a cure where a true and severe degree of flat foot exists. A proper support may be applied, and all its benefit lost by an improper shoe. Perfect reduction of deformity may be gained by the use of a support, and by not strengthening the muscles and cultivating normal movements the foot may be still further weakened rather than improved. A badly fitting support will do harm where the same support might be of great service if properly made. Very slight degrees of flat foot may not need supports, very severe degrees may need operative procedures. Talipes valgus, whether complicated by equinus or calcaneus, cannot be treated in the same manner as mild degrees of flat foot.

The form of support will vary, individual preferences will prevail, but the treatment of flat foot should be carried on by medical men. Supports, if used, should be correct in principle and properly made, and the routine practice of patients treating themselves or being treated by ready-made supports sold by those with no knowledge of the true anatomical or pathological conditions actually present should be discouraged.

DISCUSSION.

Dr. **Royal Whitman**, of New York, said he heartily agreed with the reader of the paper. He would like to call attention to the fact that little children with pigeon-toes almost always had weak feet or knock-knees. These children were apt to be taken to shoe stores, and have the shoe raised on the outer side. This symptomatic intoeing was often noticed by the mothers long before they noticed any more serious deformity.

Dr. **R. Tunstall Taylor**, of Baltimore, said he had seen a number of cases, on making impressions, in which there was a definite varus. These children were accordingly etherized, and the contracted tissues stretched or cut on the inner side. He had recently seen a case bearing on Dr. Townsend's paper, in which the patient had been made steadily worse by wearing a foot-plate prescribed and made by an instrument-maker. The foot was held more abducted by the plate than it had been without it, and was therefore more painful.

Dr. **Whitman** said he had understood the last speaker to say that ordinary pigeon-toe was more often a deformity of the foot than a symptom. He could not agree with him on this point, and he thought it was worthy of discussion.

Dr. **H. Augustus Wilson**, of Philadelphia, said he had been very much impressed with the amazement of the parents when told that the former bracing or supports were wrong. Of course, like others, he had found it difficult to argue with them and convince them that they had been wrongly persuaded. He had succeeded best in this by asking if they had ever heard of those about to engage in a boat-race having their arms splinted and staying in bed in order that they might not become tired or the weakness increase at the time of the race. This way of putting it seemed to appeal to them more easily than more elaborate arguments or explanation. Physicians had been opposing drug-store prescribing, and ophthalmologists had opposed the prescribing of eyeglasses by opticians, yet it was very difficult to overcome these practices.

Dr. **Newton M. Shaffer**, of New York, said it had gotten to be so in his city that, if any one had a pain in the foot, he would go to a shoe store or clothing store and get a flat-foot plate or some special shoe. Some of these plates were made of metal, while some shoes were so made as to produce the same effect. He knew one patient who went to a department store in this way because she had learned something about flat foot and shoes from the paper presented by Dr. Lovett.

Dr. **Goldthwait** said he agreed with all that had been said in the paper, but he thought there was a class of cases in which the patient was undoubtedly flat-footed, which he had been in the habit of treating with flat-foot plates, and in which he had been able to obtain practically no improvement. In such cases he had largely given up the use of flat-foot plates. These cases were instances of rigid or extreme valgus in which it might be possible under ether to effect partial correction, but in which by all the methods of manipulation it was impossible to thoroughly over-correct the feet. Many such cases came to their clinic after having had all sorts of manipulations. Within the past few months they had recognized these cases as examples of club foot of the valgus type, and they have been treated just as they would treat a persistent case of obstinate valgus. They had usually excised the scaphoid, thus shortening the inner side of the foot, after which the correction of the position was easy. He was sure the blunder had been in depending upon foot-plates when there was a definite deformity requiring a surgical measure. The class was a definite though not very large one.

Dr. R. **Tunstall Taylor** said, replying to Dr. Whitman, he did not mean to imply that *all* cases of turning the toes in were cases of contraction of the inner structures or varus deformity, but tracings of *many* cases showed that the angle of deflection was greater than 35°, and that the inner structures were the ones at fault.

X.

THE IMPORTANCE OF SUPPLEMENTING TENDON TRANSPLANTATION IN THE TREATMENT OF PARALYTIC TALIPES BY OTHER PROCEDURES DESIGNED TO ASSURE STABILITY.

ROYAL WHITMAN, M.D., NEW YORK.

To estimate accurately the permanent improvement derived from the operation of tendon transplantation for paralytic talipes, one should consider it apart from the procedures with which it is usually combined.

These are the removal of contractions and deformity by tenotomy and by force, supplemented by long-continued fixation in an attitude of over-correction.

Functional use of a part so fixed and protected is often followed by the unexpected development of weak muscles, which, with the adaptation of the tissues to the improved attitude, assures for a time at least a very marked improvement both in appearance and function of the foot. If one adds to this the negative effect of the removal of the distorting force of the transplanted muscle, it is very often apparent that the positive gain in functional ability due to the transplantation itself is of small moment.

I am inclined to think, therefore, that those who have had considerable experience in the operation, and the opportunity to analyze critically the later results, will admit that tendon transplantation, in its original form at least, is, on the whole, a disappointment.

The limitations of treatment in cases of this character are, of course, evident; for, as all the muscles and the normal degree of muscular power are necessary for perfect function, it follows that the disability caused by paralysis will be proportional to its distribution and degree.

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The simplest and most important function of the foot is weight-bearing, which is possible even when no muscular power is exercised. Next in importance is plantar flexion, in which the leverage force of the calf muscle is employed; then dorsal flexion to prevent toe drop; finally, adduction and abduction.

The object of operative treatment is to adapt, as far as may be, the disabled part to the work it is called upon to perform. In this the first essential is the prevention of deformity, which is often more disabling than loss of power.

It is, of course, evident that the operation of tendon transplantation, of which the object is the utilization to best advantage of the muscular power that remains, should be most effective in the slighter grades of paralysis, and that it is practically of no value when this is severe and extensive. It is particularly indicated in cases of paralysis of one of the anterior leg muscles, with consequent lateral distortion; yet, even in this class, recurrence of deformity is rather the rule than the exception. In some instances the relapse may be due to insecurity at the point of attachment or to elongation of the overburdened graft, but the most constant cause of failure is the mechanical disadvantage at which the transferred muscle must do its work. This advantage may be lessened by disregarding the tendon of the paralyzed muscle and attaching the transplanted tendon directly to the periosteum at a point of selection, as advocated by Lange. To assure the security of this attachment, I have for some time inserted the tendon or its silk prolongation through a hole bored in the bone itself.

The point to which I wish to call particular attention, however, is the importance of reinforcing the comparatively ineffective operation of tendon transplantation by procedures designed to prevent deformity and to lessen the strain upon the weak muscles. The centre of .lateral motion of the foot, and consequently of lateral deformity, is the medio-tarsal joint; and, whenever the principal abductor or adductor of the dorsal flexors is lost, the remaining muscles, although possessing sufficient power to raise the foot at the same time, draw it to one or the other side.

The indication for treatment is to check lateral mobility. Lateral motion is, of course, of value in a normal foot, but it is of little consequence in one weakened by paralysis, and it is a distinct source of weakness if it induces deformity.

The most common and most important form of acquired disability is that caused by paralysis of the tibialis anticus muscle, whose loss is always accompanied by valgus and by sufficient toe drop to increase the discomfort and awkwardness.

The operation that I recommend in a typical case of this character is conducted somewhat as follows. After all restriction of motion has been overcome by forcible manipulation, an incision about two inches in length is made along the line of the tendon of the tibialis anticus muscle, the lower end of which exposes the lateral aspect of the astragalo-navicular articulation. This joint is opened, and the cartilage is thoroughly removed from the apposing surfaces of the bones, or, if the valgus is extreme, a wedge-shaped section, including the joint of sufficient size to insure slight varus, is removed. The extensor proprius hallucis tendon is then divided at a point about one inch from the toe joint, is drawn through a hole bored in the navicular, and is sutured to itself and to the periosteum at a sufficient tension to hold the foot in normal position. In most instances the tibialis anticus tendon is shortened to the same degree. The foot, the tendo Achillis having been divided if necessary, is then turned to a position of slight adduction and dorsal flexion, and the divided tissues over the joint are sutured, with the aim of holding the denuded surfaces of the bones in close apposition. The foot is then fixed in a plaster of Paris bandage for three months or longer, the patient using the part in walking as soon as the discomfort following the operation has subsided. As a rule, in the cases in which supervision is exercised, no apparatus is required, but a brace should be used if power is lacking for dorsal flexion.

It may be stated that in the treatment of children the hole in the bone is made by means of a curved trocar and canula. This latter is essential in order that the tendon may be drawn through without violence. It might be supposed that the complete removal of its tendon would be followed by the dropping of the great toe, but in these cases there is almost always hammer-toe deformity, and the power of the accessory muscle (extensor brevis digitorum) is quite sufficient to hold it in proper position.

In the treatment of varus caused by paralysis of the peroneus brevis, the foot should be fixed in abduction after arthrodesis. In this case the hallucis tendon should be attached to the cuboid bone, or, if a graft is taken from the tibialis anticus, it is elongated sufficiently with silk to permit this attachment. If the varus deformity is extreme, a wedge-shaped section may be taken from the outer border of the foot to include the calcaneo-cuboid joint.

When the calf muscle is paralyzed, and especially if the resulting deformity is of the calcaneo-valgus or varus type, I have found the most effective operation to be astragalectomy, with backward displacement of the foot upon the leg, removal of the cartilaginous surfaces of the apposing bones, transplantation of the peronei tendons to the os calcis, shortening the elongated tendo Achillis, being minor parts of the operation. The removal of the astragalus and backward displacement of the foot restores symmetry, increasing the security of the support, and assures the patient from recurrence of lateral deformity. Although arthrodesis is performed, ankylosis is exceptional: thus the transplantation of the peronei tendons may utilize the slight muscular power of these lateral muscles to check dorsal flexion.

I am inclined to think that a slight degree of mobility at the ankle joint, if it does not lead to deformity, is preferable to the fixation that may be attained by simple arthrodesis. It is true that, if a paralyzed foot is supported in proper position by a well-fitting plaster bandage or brace, the patient may walk with ease, but the same freedom is by no means assured when the weakened part is subjected to strain. In my own experience discomfort persists for a long time after the operation, unless the foot is protected by apparatus, a discomfort which is unusual after astragalectomy. In this operation which I have already described to the Association (*American Journal Medical Sciences*, November, 1901), tendon transplantation occupies a very subordinate place; but I have mentioned it in this connection because further experience has demonstrated its usefulness, and because it illustrates the principle to which I wish to call attention. That the object of operative treatment of paralytic disability is not perfect functional cure, but a restoration of ability to the degree that may enable the patient, in favorable cases, to finally discard apparatus. In this result stability is the first essential.

DISCUSSION.

Dr. **Goldthwait** said that this presentation of the subject seemed to him very timely. He had been very much impressed with the numerous statements that had been made about tendon transplantation, as if the reattachment of a tendon was expected to make a normal part of a deformed one. As Dr. Whitman has just said, it is one of the procedures that is to be used in correcting certain types of deformity resulting from infantile paralysis, but that it did not do away with a great many other supplementary measures. There could be no question but what tendon transplantation had its place as a surgical procedure. If the patient had a muscle which was deforming a foot, it could be made to do the work, to a slight degree, perhaps, that the paralyzed muscle had done, and improve the patient's gait. In the favorable cases it made it possible frequently to discard a very clumsy brace and substitute a lighter one. Exceptionally, it was possible to discard all apparatus, but in most cases some apparatus was needed because a weak part was left behind. He was sure it was better to make the attachment to some stable base, such as the bone periosteally. Some of the most satisfactory cases functionally that he had seen were those in which the operations had been performed upon the thigh in reattaching the sartorius, gracilis, or biceps muscles. Without the operation it had been necessary for the patient to walk with the hand holding the thigh in extension, or else make use of apparatus for this purpose. By the transplantation of the sartorius, the biceps, or the gracilis, although the part was functionally weak, there was frequently enough support in the muscle to steady the leg and allow the patient to walk upon a level surface without any support. Frequently there was sufficient strength in the sartorium to allow of the patient's sitting and horizontally extending the leg. In a case shown in

Boston at a recent meeting the child wore an ordinary club-foot shoe for support at the ankle, and yet it was able to sit in a chair and hold the leg out perfectly straight with the brace applied.

One other result in tendon transplantation had perplexed him considerably; *i.e.*, along the sheath of the tendon, in its previous location, a cicatrix occasionally forms, just as it forms between the divided ends of a tendon after a tenotomy. This later on organized and gave the tendon a double pull. This he had seen especially in connection with the transplantation of the posterior peroneal tendons, where it was difficult to destroy the old sheath. These tendons, therefore, later on pulled in the line of the old attachment as well as in the new attachment, which resulted in a diversion of a considerable portion of the power.

Dr. H. A. **Wilson** said he felt personally indebted to the reader of the paper, especially because it would tend to remove a prevalent opinion among the profession that tendon transplantation was a sort of cure-all. Frequently he had had cases brought to him with one or two muscles still active, and with the hope that these muscles could be used to restore the original function of the part. When Nicoladoni's enthusiasm reached the clinic in Vienna, much work was done in tendon transplantation; but it was very quickly abandoned, probably because the operation had been looked upon as largely curative, and no supplementary measures or apparatus had been used. He would like to ask Dr. Whitman whether the method he described was original, or whether it had been described about a year ago by some German surgeon. He was under the impression it was referred to last fall in the British *Medical Journal* as an original procedure.

Dr. **Whitman** said that he had been interested in Dr. Goldthwait's statement. Lange claimed that tissue formed around silk which had been used to lengthen tendons, and that in this way a cicatricial tendon could be formed which would do the work of the original tendon. He had employed the method of boring holes in bones whenever this was feasible. He did not know that any one else had done it except, perhaps, Wolff. He did not know the exact technique followed by Wolff, and he did not personally claim any special originality for the method. The operation of arthrodesis made the transplantation of the hallux tendon effective, whereas otherwise it would be ineffective. If one could prevent the recurrence of the valgus, the result would be satisfactory, otherwise it would not be. It was to the combination of procedures, which had not to his knowledge been especially urged before, that he desired to call attention.

ABSTRACTS.

SCOLIOSIS.

1. **An Experimental Contribution to the Study of Scoliosis. The Influence of the Erector Spinæ Muscles upon the Spinal Column of Rabbits.** From the laboratory of the surgical clinic, Bern. By Dr. C. Arnd, Privatdocent and Sekundärarzt of the surgical clinic. 47 illustrations. *Archiv für Orth., etc.,* Bd. I. Heft 1 & 2.

The author discusses the etiological theories of scoliosis at considerable length, showing how widely discordant they are and how important it is that experimental work be done to reconcile them. He then analyzes the experimental work of Lesser, Motta, Ribbert, and Wullstein, and describes the results of his own work on rabbits, in which he studied the effect of one-sided weakness of the backs of animals produced by excising a portion of the erector spinæ muscle of one side in the region he desired to study.

In the first experiment (age of rabbit not stated) Arnd cut out the erector spinæ on the right side between the tenth rib and the third lumbar vertebra in November, 1900. The rabbit died in March, 1901,—a period of about four months. During life a curvature developed with convexity to right. Post-mortem examination showed a right convex scoliosis from the twelfth dorsal to the third lumbar vertebra, below this a left convex lumbar-sacral compensatory curve. The sacrum was 1 mm. longer on the left side, and the top of the sacrum was twisted 15° dorsally on the left. The fifth lumbar vertebra shared in lesser degree in the twist, and was 3.35 mm. shorter on left side. In the fourth lumbar vertebra was found the beginning of the right convex curve, which reached its maximum at the second lumbar vertebra, and was recognizable in the eleventh dorsal vertebra. The deformities of the vertebræ showed the characteristic shortening on the concave side and torsion backward to the right from the fourth lumbar to the twelfth dorsal inclusive, the torsion in each vertebra between upper and lower faces varying from 6° to 15°.

He operated on several other rabbits, and got uniformly a scoliosis with convexity toward the injured side, and with greatest deformity in the region of operation, but with certain variations, which he considers so significant as to lead him to state as the conclusion from his experiments that the fundamental curve is convex toward the strong side (near the rump), and that the convexity toward the weaker side higher up is secondary, and results as a compensatory curve from the efforts of the animal to walk so that the hind legs will follow the front ones properly.

He calls attention to the fact that in artificial scoliosis the bones are normal as to growth conditions and solidity, and that in animals going on four legs we get inequalities of muscular pull rather than of weight pressure and consequent muscular effort, and therefore such experiments do not have much value in the study of human scoliosis.

He gives a bibliography of 84 titles.—*G. W. Fitz, Boston.*

2. **Orthopedic Gymnastics.** By Mme. Nageotte Wilbouchewitch. Paris: C. Naud. 1903.

In a book of over three hundred pages Mme. Wilbouchewitch describes the origin and treatment of faulty attitudes. After a brief statement of the pathological anatomy of scoliosis, she describes faulty position when at rest and positions while working which cause deformity, with photographs and detail of each position. After this, methods of measurement of scoliosis, kinds of scoliosis and their treatment, are considered. Prophylactic precautions in school and at home are suggested. The work is too long to describe in detail. It is full of illustrations.—*Robert Soutter, Boston.*

3. **"Corrector,"** an apparatus for the treatment of deformities of the spine without a corset. By Theodor Wohrizek, Prag. 11 illustrations. *Archiv für Orth.*, Bd. I. Heft 1.

This is an apparatus devised by Dr. Wohrizek for the correction and treatment of deformities of the spine, which is to be only temporarily applied in the office or in the school. Wohrizek does not favor the corset, as it immobilizes the muscles and interferes with the functions and development of the vital organs. The apparatus is described and fully illustrated in this article. It has for its fundamental principle a statistical method of causing an asymmetrical corrective pressure of the scoliotic region. He claims special value for it in the treatment of scoliosis, and that it may be used in schools with a work desk especially designed to go with it.—*D. Townsend, Boston.*

4. **The Correction of Spinal Curvatures.** By v. Modlinsky. pp. 580.

The author describes his method of treating Pott's disease and such scolioses as are past treatment by the simpler methods of hygiene and gymnastics. He begins by making forcible extension of the whole spine in an horizontal apparatus of his own device. This is maintained by the application of plaster, always including the head. Scoliotic cases should be prepared by mobilization and forcible massage. The final correction is assisted by the inclusion within the plaster dressing of suitable pressure pads. He requires for the complete correction of these cases from three to six months and from three to four applications.

The results obtained in this way are, however, deceptive. The correction has been too rapidly made and at the expense of the patient's health. It cannot, for this reason, be maintained. It is more rational to expect success from portative apparatus, attempting in this way to imitate our methods in treating similar chronic conditions of the joints. The difficulty has lain in the absence of truly effective apparatus.

This is to be constructed after the Hessing type. It consists of a light steel and leather corset, embracing pelvis and thorax to the middle of the scapulæ. Fixation is accomplished by means of slots and screws. Attached to the pelvic part, in the region of the trochanters, are two lateral uprights of steel, supporting rectangular frames, whose function it is to transfer the weight of the head to the lower extremities without the aid of lumbar and thoracic segments. Transverse bars attached to these frames carry the anterior and posterior pressure pads, respectively. The head piece is a leather "Minerva," resting upon the upper horizontal bar of the rectangle.

The illustrations of the apparatus are satisfactory.—*A. H. Freiberg, Cincinnati.*

5. **Differences in the Scolioses of Male and Female Individuals.** *Zeitschr. für Orth. Chir.*, xi. 298.

A. Sutter finds that the relation of scoliotic male patients in sanatoriums to female patients is as 1:.7: in school statistics, however, it is as 1:1. Scoliosis, therefore, is as frequent in one sex as in the other. It occurs somewhat earlier in the life of females than of males. The greater number of the vertebral distortions are convex toward the left, but there are more distortions to the left in males than in females. In boys it is usually the upper portions of the spine which are deformed: in girls, the lower are deformed almost as often as the upper. The deformities are more marked in boys than in girls. [E. L.]—H. A. *Wilson, Am. Med.*

6. Congenital Scoliosis. *Zeitschr. für Orth Chir.*, 1903, xi. 411.

H. Maass reports such a case in an infant three months old. The scoliosis was convex toward the left side; its point of greatest prominence was at the height of the ninth thoracic vertebra; the deviation amounted to 3 cm.; the costal deformity to 2 cm. The remainder of the skeleton seemed perfectly normal. He sees the cause in an anomalous intra-uterine position. The treatment which produced an excellent result consisted of a plaster dressing and pressure massage of the deformity. [E. L.]—*H. A. Wilson, Am. Med.*

7. Anatomical and Clinical Value of Orthopedic Corsets. By Dr. Wilhelm Becker, Bremen. *Archiv für Orth.*, Bd. I. Heft 1, 1903.

The value of a spinal support depends upon the consideration of the spine from an anatomical mechanical standpoint. So considered, we must regard the vertebral column as firmly fixed below by the pelvic girdle and freely movable in the part above. In relieving the spine of the weight of the head, the head support should not grasp under the chin, but by the occiput and forehead. The arm-pits cannot be considered support points for the spine, for the shoulder-girdle is only loosely attached. It is further to be remembered that the spinal column is only approachable from behind. In Pott's disease it is important that the appliance fits snugly over the hips, for on that depends our ability to get pressure against the knuckle. If the corset is merely for support, it would have to reach no higher than the knuckle, and the higher that is, the easier to get support; but a jacket which reaches above the knuckle prevents lateral deviation. Lumbar kyphosis is difficult to treat, because the distance to the knuckle is so short, and because the normal lordosis is obliterated or reversed. There are four things to be gained by corsets: (1) fixation; (2) support; (3) extension; and (4) correction. Fixation corsets are to be worn day and night; and, if they are to be removed, it is well to do so under suspension. Fixation implies support, but support without fixation may be indicated in cases of long standing. Both fixation and support can only work on small parts of the column. Extension has its effect on the whole. One grasps both ends; namely, pelvis and head, not the arm-pits. Extension may be used to correct; but the only other way to get correction is by pressure upon the ribs, which are bound to intervene between jacket and spine. There are four groups of chest deformity: nervous, rachitic, spondylitic, and habitual, which have their special indications for mechanical support. The Wullstein corsets are of great value because that part of the treatment is only one link in a therapeutic chain, being preceded or accompanied by other measures.—*Henry Feiss, Cleveland.*

8. School and Spinal Curvatures. By Schulthess. Voss: Hamburg. 1902.

Schulthess denies that the school is the only or even the principal cause of lateral curvature and round shoulders, on the ground that a great many of these cases are seen well advanced before the school age. Institutional experience does not compel the belief in a special form of school scoliosis. The frequent occurrence of left lumbar convex and right dorsal convex forms is explainable in part by the normal mechanics of the spine and by certain pathological conditions of the vertebræ. Right-handedness and the displacement of the pelvis toward the left, as well as the incurvation of the spine toward the right associated with it, flattening of the bodies by the aorta, and the slight inclination of the spine toward the left caused by this, all influence the form of the curvature. All school investigations show about an equal frequency in boys and girls (boys, 23 per cent.; girls, 26.7 per cent., in Lausanne). As age advances, the frequency in girls increases almost threefold, in boys not quite twofold. On the average, one finds somewhat more than double the number in the oldest children, found in the classes corresponding to the ninth year. This indicates as much the progress of old scolioses as the formation of new.

56 per cent. of all scolioses are total. The lumbar follow with 20, dorsal

12.7, and combined with 8.5 per cent. Increase of total scolioses forms the main contingent in the added frequency of scolioses. In addition, the lumbar curves of girls show a decided increment.

The result of the Lausanne investigation has been to show the increase of total scoliosis and the lumbar curves in girls. Schulthess says that the position in writing gives the spine of a child naturally disposed to yield toward the left an opportunity to assume this position often and to maintain it for long periods. He therefore regards sinistro convex total scoliosis and the lumbar curves of girls as forms especially favored by school occupations, and therefore justifiably called "school scoliosis" in a certain number of individuals. Curves whose beginnings were indicated before school life are accentuated. Sitting, lack of exercise, etc., favor the further development of the abnormal growth already begun; but the school is not entitled to all of the blame.

In prophylaxis he recommends shortening hours, insists upon hourly pauses, regular gymnastic exercises, proper illumination, suitable furniture, perpendicular writing, and frequent examination of pupils. Decidedly deformed children should be put in special classes.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

9. **The Correction of Severe Scoliosis and Kyphosis.** By Schanz. *Wien. klin. Rundschau*, 1902, No. 51.

In proper cases this is the most successful method of treating severe cases. By forcible correction, however, we can accomplish only the straightening. The process itself can only be terminated by restoring the balance between the functional potency of the spine and the functional demands made upon it. The redressment is made in his extension frame by applying a well-padded plaster dressing from trochanters to head under powerful extension. During the setting further correction is made manually. After three to four days the procedure is repeated, and again after similar intervals, until no further improvement can be obtained. He has noticed as much increase of body length as 18 cm. After one and one-half months this dressing is replaced by a hardened leather and drilling corset with head support. During the night a posture bed is used. Energetic treatment by gymnastics and massage is now given. The treatment is not concluded until the patient holds himself in the corrected position. Exercises and the corset are continued for several years longer.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

10. **Clinical Observations on Backache.** Robert W. Lovett. New York *Medical Journal*, May 30, 1903.

From an orthopedic standpoint certain well-defined types of backache present themselves which are divided roughly into two groups, those due to causes existing in the spine itself and those due to external causes. Among the first is faulty spinal attitude, in which the extra strain is borne by certain ligaments not calculated for them. In round shouldered, lax-spined young women, pain is not infrequent, and is familiar under the name of irritable or neurasthenic spine. In lateral deviation of the spine, when due to a shorter leg on one side, pain is not uncommon, and is often situated in one or the other of the sacro-iliac joints, or in the loin or around the scapula. The pain is on the convex side of the curve rather than on the compressed side. The correction of the shortened leg by a thick sole will in many cases do away with the backache. The cases due to injury or trauma include sprains of the back, which are often serious, far more so in their symptoms than would be suggested by the anatomic conditions. Instead of being put to rest like an injured ankle, it is the rule that the parts are kept in action, and the treatment is therefore embarrassed. In chronic or acute [sprain absolute rest and fixation are necessary, or their restricted use. There is also a persistent backache without obvious cause. Three conditions of the foot are mentioned, such as flat foot, which is not common in private practice; pronated foot, which is more common, the weight of the body being transmitted diagonally through the arch instead of straight down, and pain and irritability result. This is most commonly called flat foot, but it outnumbers the cases of real flat foot many times over. Another condition is what is called contracted foot, which is very little known and but imperfectly understood. It is characterized by shortness of the muscles of the back of the calf, and their stretching is necessary in the treatment. Backache is a common accompaniment. The pain from these three conditions is generally in the small of the back, and is aggravated by stooping or standing. It also results from walking. The real flat foot and pronated foot are easily treated by foot plates, and the backache disappears if this is the cause. In case of contracted foot, stretching of the calf muscle is necessary, and the under side of the foot must be supported by a pad or a short steel plate. The arch of the foot must be correctly supported.—*Abst. in Jour. Am. Med. Ass'n.*

SPINE.

11. Tillman's "Genesis and Treatment of Spondylitic Paralysis." *Von Langenbeck's Archiv*, vol. 69, Nos. 1 & 2.

Spondylitic paralysis is comparatively rarely brought on by direct bone pressure. This happens only (1) by bone edges when the spinal cord has been fixed by dural adhesions; (2) by sequestræ; (3) by callus, this usually in the older, more nearly restored cases. Paralysis may come on also in consequence of peridural connective tissue increase. During the course of spondylitis itself, paralysis is most frequently caused by exudation, abscesses, and caseiform products of decay. Later on, in the natural course of events, by peripachy-meningitic granulations. Much depends upon the pressure to which an epidural exudate has been subjected. A lessening of the pressure is followed by a yielding of the paralysis. It is for this reason that often synchronously with the formation of a superficial abscess there comes a general improvement. Pressure causes an œdema within the spinal cord, which undergoes in consequence trophical disturbances. Duration of the process is less important than intensity of pressure. Losses of nerve substance can never be made up.

The treatment is a bloodless orthopedic one. Extension and redressing apparatus for rest and support should be considered. Even after the paralysis has begun to improve, the vertebral column should be kept in fixation as long as possible. "Kyphosis" not yet fixed, and not too old, can be redressed by degrees. Of course, in the perfectly fixed and very old cases, this cannot be done.

Operations.—Two methods:—

(1) An opening into the vertebral bodies from the side and a permanent drainage. The best method of performing this is the costo-transversectomy of Ménard. This will be applicable in the not too old cases of tuberculosis of the vertebral bodies.

(2) Laminectomy, especially in cases of caries of the vertebral arches, and as a late operation in the older, nearly cured cases, in which granulations, callus, sequestra, and bone edges have been the causative agents.

Every operative procedure must always be followed by long orthopedic after treatment.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

12. On the Casuistry of the "Bechteren" Stiffness of the Vertebræ. Dissertation of inauguration (F. D.), Jena, 1902. By H. Vollheim.

A discussion of one case of stiffness of the vertebral column limited to the lumbar region. The case therefore was very like that described in No. 1 of the *Archiv's* referates, the essential difference being that in one an infectious (influenza) origin was supposed, while the other case followed pure traumatism. The author sifts the significant cases, but believes it impossible to completely separate the Bechteren and the Strumpell-Marie types.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

13. **The Presentation of Diseases of the Spine by Roentgen Rays.** By P. Sordeck. Hamburg: Eppendorf. *Archiv für Orth.*

Dr. Sordeck discusses the difficulty of examination of the spine, and shows the value of the Roentgen rays in determining the presence of disease and its site. He claims the best success is obtained in the cervical region, in spite of the small bodies and processes of the vertebræ, then with the lumbar, and lastly with the dorsal region, which is most difficult, owing to its close proximity to heart and liver. In order to obtain success, the observer must make a systematic study of each vertebra, and must take many plates of each case. He also describes the technique to be observed. Then follows a description of the various regions of the normal spine and their peculiarities, as shown by the Roentgen rays, and the pathological changes of the spine and vertebræ in scoliosis, fractures, luxation, and luxation fractures, tuberculosis, caries, cold abscess, malignant tumors, ankylosing spondylitis, and congenital deformities (spina bifida, etc.). He gives a series of clinical cases with analyses of the radiographs of each. The article is accompanied by 19 Roentgen pictures.—*D. Townsend, Boston.*

14. **Localized Traumatic Inflammation of the Vertebral Column.** By Bettmann, Leipzig. *Archiv für Orth.*, Bd. I. Heft 2, 1903.

The article is a discussion of a case of injury to the spine to illustrate the far-reaching effects of what is often mistakenly called a sprain or stretching. The medico-legal aspect is considered. Objective signs may be entirely lacking. In the case in point the patient complained for many years of pain and disability, and finally deformity came on. There was marked stiffening and lordosis in the lumbar region. The course and pathology of such cases is given, and the condition designated as traumatically ankylosed spine.—*Henry Feiss, Cleveland.*

BONES AND JOINTS.

15. **The Development of the Radiograph.** By G. C. Johnson. *Journal of Advanced Therapeutics*, April, 1903, p. 224.

Johnson gives some practical hints on the proper development of an X-ray plate. He emphasizes the necessity of becoming thoroughly familiar with one kind of developer, as a great deal of time is wasted by the average man in experimenting with plates and developers. By trying all that there are on the market, one may know much about developers and very little about development. By constantly using a developer of known value, one learns how to modify it to suit the various exposures. As a rule, it is best to use the developing formulæ that are found in all boxes of plates. It must be borne in mind that an X-ray plate requires developing to a much greater density than for any other purpose. For an over or under exposed plate the best remedy is to throw it away, and make a proper exposure. An under-exposed plate is never satisfactory. The secret of success is to learn the capacity of your machine under varying conditions and to judge the current passing through the tube, and govern the length of exposure by the quantity and penetration of the rays emitted during the exposure. Balance these against the size, weight, and muscular development of the patient. In this way only can a correct exposure be formulated. The successful radiographers are those who use one brand of plate, one developer, a given type of apparatus, and a tube with whose every mood they are familiar.—*L. A. Weigel, Rochester.*

16. The Roentgen Rays: In Differentiating between Osteomyelitis, Osseous Cyst, Osteosarcoma, and Other Osseous Lesions, with Skiagraphic Demonstrations. By Beck. *Jour. Am. Med. Ass'n*, vol. 28, No. 1, 1902.

Beck presents a number of skiagraphs showing what the Roentgen rays will do in differentiating between osteomyelitis, osseous cyst, osteosarcoma, and other osseous lesions. He shows that the X-rays are of value in making an early diagnosis in cases of osteomyelitis, and that it will demonstrate every focus of the disease. Abscesses may be so well outlined that the technical steps of the operation may be definitely traced in advance. If but one focus shows, no other region of the bone need be attacked. The size and shape of sequestra can easily be made out and every position defined, and many times the rays will show one which it is impossible to feel with a probe. In arthritis the contours appear indented and in places veiled. Deposits are recognizable as light shadows, as they consist of translucent muric acid salts. In all tubercular lesions of the bones and joints the rays give definite information as to the seat and exact extent of the tubercular areas. Periosteal sarcomata are characterized by spiculated trabeculæ radiating from the surface. The soft variety shows absence of osseous tissue, except small fragments. A skiagraph of an osteosarcoma proper shows more osseous tissue than the former variety, but its outlines are very irregular. Beck considers the skiagraph expression of syphilis as characteristic.—*L. A. Weigel, Rochester.*

17. A New Contribution to the Treatment of Tuberculosis of Bones and Joints of Children after the Lannelongue Method. By M. Motta. *Archiv für Orth.*, No. 3, 1902.

Motta has for ten years followed the Lannelongue method with good and at times splendid results. He describes the technique. The injections should not be made directly into the affected part, but only into the immediate surrounding tissues. The periosteum is to be injected in case of bones and joints, and the periglandular issue in case of adenitis.

Differing from Lannelongue, he at once applies a compression dressing, and prefers to repeat the injection, which for the first time is not very strong. He uses a 10 per cent. solution, and carefully avoids letting the solution come in contact with the skin, in order to guard against an easily occurring necrosis. The injection, therefore, should always be made underneath the fascia, and, if rather superficial, the needle should be introduced in an oblique direction. The compression dressing makes the operation relatively painless, often not requiring narcotization.

Out of 24 cases of joints, he cured 14 with almost perfect mobility, 3 with 90°, 3 with 40 to 45°, and 4 with ankylosis. He states that the injections should not follow each other too quickly. The reports of the diseases he has cured are given in full, and include other affections. He warmly recommends the method to physicians, considering the fact that the cicatricial tissue can be differentiated from the affected tissue, and thereby later operations, if in certain cases they should become necessary, are made easier.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

18. The Spontaneous Correction of Bone Deformities. By Port. *Mün. Med. Woch.*, 48, 1902.

A case of severe rachitic curvature of the leg is reported, in which in the course of time a considerable amount of spontaneous correction occurred. According to the radiogram, the straightening took place as the result of a compensating deviation of the bone's long axis at the epiphyseal line, produced by unequal growth at this place and by the compensatory unequal activity of the periosteum. Port considers this observation as valuable evidence against the far-fetched conclusions which have been drawn from Wolff's observations on the transformation of bone, correct though they be within certain limits. This pertains especially to the changes of the form of the bones in response to changes in function in adult individuals. He believes that these transformations can, for physiological reasons, take place only in children, and even in these are restricted to such bone particles as are destined by natural growth to disappear. In their place properly arranged trabeculæ are formed. In inflammatory conditions and fractures only can the bone of the adult become again active in this way, the periosteum being put back into a formative condition.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

19. Osteomyelitis Albuminosa. Dissertation, Freiburg, 1903. By Sinz.

Report and analysis of a case. The peculiar albuminous fluid is the only distinguishing characteristic feature of the disease, and the only one which serves to differentiate it from suppurative osteomyelitis as regards etiology, symptomatology, or, for that matter, pathological anatomy. He regards it simply as an anomaly in the course of acute infectious osteomyelitis, whose cause is as yet entirely hypothetical.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3

20. Osteogenesis Imperfecta. By Harbitz. *Norsk. Mag. F. Lagevidenskaben*, A. 63, N. 1, 5 L., 1902.

Collection of twenty-one cases from the literature with report of one original. Radiogram. The principal characteristics of the condition are given as shortness of the extremities with well-developed head and trunk. The cranial base is normally developed, but with brittle and osteoporotic bone nuclei. No premature synostosis. Incomplete development of the bone centres of head and face. Imperfect ossification especially marked in the long bones. These are extremely slender, thus leading to numerous fractures. These may be multiple in the same bone, and may occur ante- or post-partum. Microscopic examination shows a proliferation zone that is of proper form, but too small. The various bone thickenings are callus formations after fracture, and not swellings of rachitic or luetic character. The cause of the condition is entirely unknown. Chondrodystrophy and osteogenesis imperfecta are entirely distinct and, to a degree, opposite conditions. Osteogenesis imperfecta is preferred to achondroplasia as a name, because the French have been confusing the two forms under this title.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

21. A Case of Osteogenesis Imperfecta. Dissertation, Giessen, 1902. By Helwig.

Late investigation has shown that the so-called fœtal rachitis has nothing in common with true rachitis, and that it is, in fact, not to be regarded as an entity at all. Cases formerly described as fœtal rachitis should be classified either as chondrodystrophy or as osteogenesis imperfecta. The latter consists of an interference with bone formation, while the former is caused by imperfect cartilage growth and a premature cessation of endochondral ossification. A case is reported with X-ray and microscopic examination.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

22. Trauma as Cause of "Locus Minoris Resistentiæ" in Bones and Joints. Dissertation, Kiel, 1902. By Prahl.

The author attempts to show that in the production of the infectious diseases of bones and joints the presence in the body of the infectious material is not sufficient to account for the localization of the disease, but that there is necessarily some predisposing circumstance to which the inflammatory process owes its inception.

A case is presented which is believed to show the infection of a focus of diminished resisting power as the result of trauma through the medium of the circulation. This was afterward found to be a piece of bone which was torn loose.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

23. Lesions of the Tibial Tubercle occurring during Adolescence. By Robert B. Osgood, Boston. *B. M. & S. Jour.*, vol. cxlviii., No. 5.

The adolescent tibial tubercle, from its situation and mode of development, is susceptible to injuries, especially in athletic subjects. These lesions are usually caused by a violent contraction of the quadriceps extensor.

Fracture and complete avulsion of the tubercle are rare, cause loss of function, and are easily diagnosed, usually clinically and always by means of X-ray.

Avulsions of a small portion and partial separation of the tubercle are more common. They do not cause complete loss of function, but without treatment long-continued serious annoyance. The diagnosis should be made by a combination of the clinical and X-ray pictures; and, before the latter are accepted as evidence, both knees should be skiagraphed, and accurate technique observed.

24. Avulsion of the Tibial Tubercle. By Francis D. Donoghue. *B. M. & S. Jour.*, June 11, 1903.

The cases previously reported have been those of active, athletic boys between thirteen and sixteen. The author's case is that of a girl of thirteen, likewise muscular and athletic. While vaulting over a horse in a gymnasium, she fell, striking the cushion with her knee. There followed swelling and pain, especially noticeable on attempting to kneel. After five weeks she came under the writer's observation. There was swelling, stiffness, and some pain, especially in the region of the tibial tubercle. The patellæ were of the same elevation. The Roentgen rays showed plainly the true condition,—avulsion of the tibial tubercle. Under treatment by strapping the leg became almost perfect functionally.—*Abst. in Am. Medicine.*

25. Contribution to the Knowledge of Acute Bone Atrophy. By A. Exner. *Fortschritte auf dem Gebiete der Roentgenstrahlen*, Bd. VI. Heft 1.

So-called acute bone atrophy may take place in fractures, acute inflammations, gonorrhœa, lues, and numerous other diseases. There is a thinning of the cortex, and at the same time the spongy portion becomes wider meshed. The muscles do not necessarily atrophy with the bone atrophy. It may be very marked, even if the primary disease is not severe. Probably the cause is disturbance in the circulation. That property of the bone which entails the building up of new trabeculæ, according to Wolff's law, is disturbed. Physical experiments show a loss in the weight: chemically, there is no gross change in the composition.—*Abst. Archiv für Orth.*, Bd. I. Heft 1.

26. Acute Bone Atrophy following Inflammations and Injuries of the Extremities and its Clinical Appearance. By P. Sudeck. *Fortschr. a. d. Geb. d. Roentgenstrahlen*, Hamb., 1902, v. 277.

Acute phlegmons of the joints frequently result in long-continued functional disturbances, especially in the hands; and this may continue for months. In many cases complete restoration does not take place, and stiffness of the fingers and wrist is more or less permanent. In these cases the phlegmonous process is not in the fingers themselves, but localized in the wrist joint; and the change in the fingers is secondary. The condition is not due to prolonged immobilization, as there is a marked change in the bone structure itself, which may be accurately demonstrated by the Roentgen rays. Sudeck finds these changes in the bone very frequently after inflammatory processes of the soft parts. Even where there has been no involvement of the joints and tendon sheaths or suppuration of the finger joints, the characteristic bone changes are seldom absent. He gives the history of a series of cases in which the characteristic bone atrophy could be demonstrated, and included fractures into the joints,—sprains, contusions, crushing of joints, injury of soft parts, nerve injuries, and herpes zoster with neuritis. A review of the cases shows that after traumatisms of every kind, as well as after prolonged inflammation acute inflammation of large and small joints, osteomyelitis, tenosynovitis, and phlegmon of soft parts), a resorption of bone, demonstrable by the X-ray, may be shown. Nerve injuries may also be a factor. The injuries are, as a rule, not severe. It must be admitted that joint affections are more apt to predispose to bone atrophy than fractures, and that this atrophy occurs more frequently after inflammations than from simple traumatism. In acute inflammations of the larger joints, at least of the wrist, an acute atrophy of the whole hand skeleton is the rule; and this also occurs quite frequently after injuries. The disappearance of the normal bone structure is very marked, and shows in a surprisingly short time after the traumatism. The shortest time observed was four and a half weeks, and after eight or ten weeks it may reach a high degree. It thus differs from the well-known forms of bone atrophy due to senility and non-use. In the X-ray picture this bone atrophy may be observed in various forms. In the earlier stages there is an irregular spotted condition of the bone shadow. In the hand this spotted condition is first noticed in the spongy substance, then at the base of the phalanges and metacarpals, and finally in the carpal bones. At times the bone appears to be perforated in spots. The compact layer of bone is only affected at a later period. This condition may disappear as rapidly as it began, so that after some weeks nothing pathological can be detected. With this restoration of the normal, the functional disturbances also disappear, if the disease has not existed too long.

When the atrophy has existed for a long time, the X-ray plate shows the chronic form. The structure of the bone is still visible, but all of the lamellæ are much more delicate and thinner than normal: the bones appear translucent. The practised eye at once recognizes the significance of this pathological condition. In the soft parts, vasomotor disturbances are observed, and consist of cyanosis, with a subjective and objective coldness of the skin, an œdema.

The diagnosis is based upon the skiagraphic demonstration of the bone atrophy. Sudeck's conclusions are that he has been able to prove that, after inflammations and injuries of the extremities, in addition to muscular atrophy and trophic disturbances of the skin, an acute bone atrophy may also occur, which, in the light of our present knowledge, must be considered as a trophic neurosis, and that, furthermore, this bone atrophy may produce very marked and persistent disturbances of function. The disturbance of function is only indirectly connected with the original trouble, so that under certain circumstances the muscle and bone atrophy may acquire the characteristics of an independent disease. Furthermore, it is important, not only for diagnosis or differential diagnosis, but also for treatment, to give particular attention to the above-described X-ray findings. It is frequently desirable to make X-ray plates of both the affected and unaffected extremity, to appreciate, by comparison, the character of the bone changes.—*L. A. Weigel, Rochester.*

27. On Habitual Luxation. By Dr. Walter Wendel, Marburg. *Archiv für Orth.*, Bd. I. Heft 1.

Wendel considers the etiology of habitual luxation as given by different authors—Joessel, Roser, Franke, and others—from autopsies and operations. He discusses several cases of shoulder luxation that were observed in the Marburg clinic. He describes Heusner's operation of deepening the sigmoid fossa, also the operation of Bloch for habitual luxation of the elbow, and describes three cases operated in the Marburg clinic. He discusses the etiology of the condition, the changes in the bone due to disease of cord, such as tabes and syringomyelia. He divides the cases into traumatic and pathological, and regards the traumatic as operable, while the pathological ones are disease symptoms, and only rarely can be operated. Voluntary luxation is a curiosity, while the habitual is a disease. The article has 3 cuts and a bibliography of 39 titles.—*D. Townsend, Boston.*

CONGENITAL DISLOCATION OF THE HIP.

28. Results of Bloodless Reduction of Congenital Hip. By M. E. Kirmisson. *Revue d'Orthopédie*, May, 1903.

When Lorenz first brought forward the bloodless reduction of congenital hip, he considered it a radical operation for cure of the deformity, not a palliative form of treatment.

The following year, before the Imperial Medical Society of Vienna, he was obliged to acknowledge that his first statements claimed too much, the X-ray showing in many cases that there was a secondary forward and upward dislocation following reposition.

In 1899 Lorenz made a statement of his results. In 22 cases reposition was impossible. In 15 cases there followed backward dislocation. In studying from the X-ray 135 of his early cases, Lorenz found 56 doubtful or incomplete results, and 79 satisfactory cases from an anatomical point of view.

Hoffa believes that the bloodless method rarely gives permanent reduction. Often, however, there is improvement by this method of treatment, although the result is not a complete reduction. The head of the femur finding a firm point of pressure against the pelvis, a good functional result is obtained.

Peterson published the results of Schede at the Bonn clinic, and concludes that nothing is rarer than a complete reposition. In 161 cases, 70 being double, there were but 8 satisfactory reductions among the single cases, and but two among the double congenital dislocations. As a rule, a transposition is the result.

Kummel, of Hamburg, obtained good functional results by transposition; but otherwise, in 66 congenital dislocations on 50 patients, reposition was obtained in but 11 cases.

In 1900 Broca reported but two real reductions, while Rédard reported 12 in 32 cases.

Joachimsthal obtained 17 good results in 23 cases.

Burghard, however, obtained but one positive reduction in 20 cases.

Nové Josseraud, of Lyons, reports 25 reductions, 37 transpositions, 2 fractures, 3 relapses, and 2 immovable heads.

Finally, Müller, of Stuttgart, in 40 single cases obtained 28 cures,—*i.e.*, 70 per cent.,—and five complete cures in 21 double cases.

The absolute value of the bloodless treatment is not as yet statistically fixed, and Kirmisson urges that reports of results be made in order to determine the absolute value of bloodless reposition. In his service at the Trousseau Hospital since 1898 (*i.e.*, in the last five years), of 27 unilateral cases, 10 were either impossible or for some reason other treatment was tried, so that 17 cases were operated by the bloodless method, with the following results: 5, no shortening; 2, 1 cm. shortening; 6, with 1 cm. shortening; the others from 2 to 4 cm. shortening. Functional results are good in the majority of cases. Of 27 bilateral 21 were treated: 3, excellent results; 11, good results; only 3 relapses of one side, and but 1 relapse of both sides. There is a detail of cases and of operative procedure.

Kirmisson favors the selection of treatment for each case in congenital traumatic or pathological luxation, choosing the least violent that the case allows rather than to succeed by force at the risk of doing much harm.—*Robert Soutter, Boston.*

29. Present Status of Congenital Dislocation of Hip. By V. P. Gibney. *Am. Med.*, May 30, 1903.

Conclusions:—

1. Do not rest content in a case of hip lameness in a young child until you have made a thorough examination and obtained a full history.

2. Diagnosis being established, aim to get a reduction before the sixth or seventh year. It is fatal to postpone operation.
3. In cases beyond the age limit, ascertain the exact position of the head, its shape, and relations by an X-ray.
4. Do not make long attempts at reduction in patients over ten years.
5. Bear in mind the dangers which Lorenz himself has pointed out: too extensive laceration of soft parts; paralysis, which may or may not yield in time to treatment; fracture of the femur or of the pelvic bone; the rupture of arteries, sometimes the femoral.—*R. Soutter, Boston.*

30. Subluxations in Congenital Hip Dislocations. By Walther. *Muen. Med Woch.*, 1903, No. 14.

Reports nine cases of incomplete congenital luxations with tracings of radiograms. Emphasizes Lange's advice to make radiograms in external rotation as well as internal rotation of the thigh. In this way one may avoid overlooking some cases of subluxation. Antagonizes Lorenz's advice not to attempt the reduction until children are of cleanly habit, as by so doing the attempts at walking may convert some subluxations into complete luxations, making conditions more difficult.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

31. Curing Congenital Hip Joint Luxations by Bloodless Reposition and the Anatomical Procedures. By E. Müller, Stuttgart.

a. Left hip of a girl aged four years, replaced successfully two years before. The healing was a perfect one as regards function. The muscles showed perfectly regular proportions. The joint itself was not to be distinguished from a normal joint. The socket is regular and even smooth, covering about two-fifths of a circle. The roof consists almost entirely of cartilage, the head being closely opposed. The neck appears somewhat more clumsy. The capsule is tightly stretched over the head, and the ligamentum teres is well preserved.

b. Discussion of another case.—Here the head does not touch the socket in its whole circumference, because the curves do not conform to the shape of the head. The socket is flat, like a dish, while the head is irregular. The capsule shows no more wrinkling, and it evidently shrinks up fairly quickly, but will not be firm enough to hold the head in motion for three or four months.

Undoubtedly, the limb influences the formation of the joint: both play their parts. Müller has cured twenty-eight out of forty unilateral dislocations with perfect success. He always applies the dressing in extreme abduction external rotation, and with the knee perfectly stretched. Only in this way can the head be fixed.

Of the double cases he had five out of twenty-one perfect cures. He reproaches himself with having begun treatment of children who were too old, and with having made repositions of both legs on the same day, thus losing the opportunity of making use of walking. Nowadays he refuses to make repositions on children over five years old in cases of double dislocation. He has had perfect results in cases of one-sided dislocations in children of eight.

To prepare by pulling he thinks unnecessary, except in cases of older children. The after treatment of babies is entirely unnecessary.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

32. An Apparatus for the After Treatment of Congenital Luxation of the Hip. *Deutsch. Med. Woch.*, February 19, 1903.

L. Heusner demonstrates a new apparatus which he has found valuable in maintaining the legs and feet in proper position after the reduction of congenital hip dislocation by Lorenz's method. It consists of a leather corset for the trunk and pelvis, a short leather piece for thigh connected to body-piece with springs, which prevent immoderate flexion, and keep the thighs spread out. Spinal springs extend downward over knee to foot. They tend to keep the feet and legs inverted. It is especially valuable in bilateral cases.—*H. A. Wilson, Am. Med.*

33. **A Note on Some Radiographs illustrating Congenital Dislocation of the Hip.** By Morgan. *British Medical Journal,* April 11, 1903.

Morgan illustrates his statement that radiography should assist the operator in the selection of suitable cases by a series of plates. Radiography is of value in determining the character of the reduction, and enables one to follow the case closely during the long period of after treatment. False position of the limbs during the exposure may lead to erroneous interpretation of the radiogram.—*L. A. Weigel, Rochester.*

34. **Congenital Luxation of the Hip.** By Veau & Cathala. *Archives de Méd. des Enfants,* No. 1, 1902.

Anatomical examination of the right hip of a child which died one and one-half months after bloodless reduction. Concludes that true reduction is possible from anatomical standpoint, and that abduction and outward rotation is the best position in which to fix.—*Abst. Zeitschr. für Orth. Chir.,* xi. 3.

35. **Congenital Fissure of the Neck of the Femur.** By Helbing. *Deutsch. Med. Woch.,* No. 15, 1902.

Four cases reported with radiograms. They were incomplete fissures at right angles to the axis of the neck, accompanied by diminution of the angle between neck and shaft, elevation of the trochanter and shortening of the femoral neck. Clinical picture similar to congenital luxation. No question of trauma or rachitis. Therapeutically suggests manual osteoclasis of femoral neck.—*Abst. Zeitschr. für Orth. Chir.,* xi. 3.

36. **Interpretations of Radiograms in Congenital Hip Luxations.** By Gourdon. *Rev. Mens. de Gynecol.,* No. 4, 1902.

Draws attention to the discrepancy which may exist between the clinical characters and the appearance of the radiogram. Explains this by assuming that the hold of femur on pelvis is maintained in early life, not by a bony socket, but by tissue which is easily penetrated by the X-rays. He warns not to judge the result of reduction manœuvres by radiogram alone.—*Abst. Zeitschr. für Orth. Chir.,* xi. 3.

37. **Gwilym G. Davis.** *Am. Med.,* May 30, 1903.

Describes the methods of Paci, Heusner, and Lorenz in treatment of congenital dislocation of the hip.—*R. Soutter, Boston.*

HIP DISEASES.

38. **Etiology of Coxa Vara.** By Haedke. *Deutsch. Zeitschr. für Chir.,* Bd. 66, Heft 2.

Histological examination of a specimen of coxa vara obtained by resection from a seventeen-year-old patient. Found a condition similar to rickets, both macro- and microscopically. Concludes that coxa vara may develop at the age of puberty consequent upon the so-called late rickets, although the "juvenile osteomalacia" of Kocher is probably the explanation of the greater number.—*Abst. Zeitschr. für Orth. Chir.,* xi. 3.

39. **Coxa Vara as a Deformity caused by Weight.** By Blum. *Langenbeck's Archiv*, 69th v. o3, N. 4.

A boy nine years old, who four years previously had had tubercular coxitis, was brought to the Vienna public hospital because his mother thought that his left leg was some 4 cm. longer than the right.

The examination had the following result. There was no lengthening of the left leg, but a shortening of the right leg, the trochanter of which was elevated. The cause of this was a right-sided coxa vara, brought on undoubtedly by a limited use of the left and an excessive use of the right leg. From this observation, and from the preparations of the Vienna collection, the author discusses the classification and genesis of the deformity. He concludes that in many cases of atrophy of one extremity, no matter how caused, there forms a coxa vara of the other side. This is to be explained simply by the over-weighting of the sound extremity.

It is of practical importance, because here the important antecedent symptom of Hofmeister—namely, the muscular atrophy on the coxa vara side—is wanting.

Coxa vara is a statical deformity. The influence of the weight of the trunk is to be demonstrated in many cases, while other affections, which usually are considered as causative, exert only a predisposing influence.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

40. **Essay on the Problem of Coxa Vara.** Discussion at Lyon, 1903. By Yvemantt.

A review of the anatomy of coxa vara in its various phases, following the essays of Jaboulay and Piqué. He limits the term "coxa vara" to cases which come on during the growing period, and are caused by trophical disturbances. An outline of the French literature on the subject is added.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

41. **Fractures of the Femoral Neck in Childhood and Youth.** By Hoffa. pp. 529.

Since the introduction of the radiographic method, the number of reports of this condition has been greatly augmented. In addition to fifty-three cases previously collected by Gerstle (Inaug. Diss. Würzburg, 1899), twenty-five cases are collected from the literature, and given in full. Hoffa adds the reports of eleven cases of his own.

Analysis of all the reported cases shows the greatest number to have occurred in the ages of ten to fifteen years. By far the greater number of cases are to be considered as epiphyseal separations. Of the eighty-seven reported cases, only four are held to be fractures of the neck. Of these, the greater number are incomplete breaks.

Etiologically, the cases are divided into two groups. The first are those occurring in previously healthy children. The second comprises patients in whom there had existed some abnormity of the femoral neck, chiefly coxa vara. This is, therefore, regarded as of etiological importance in the production of this lesion. Frequently the symptoms are so vague, and so little disabling, that the diagnosis is not correctly made. Later in their course, these cases are looked upon as hip disease or as static coxa vara.

Early recognition of these cases must be insisted upon. Elevation of the trochanter, shortening, shortened radius of rotation of the trochanter, crepitation, and possibly sugillation in the groin, are the symptoms to be depended upon. The slight character of the disability must not be allowed to confuse.

Later, tuberculous disease and static coxa vara must be excluded by the X-ray and by the absence of muscle spasm and atrophy of high degree.

Recognized in the beginning, these cases should be treated as fractures. The necessity of preventing yielding of the femoral neck by the wearing of apparatus for at least a year afterward is emphasized. Seen late and after considerable deformity has occurred, resection or oblique subtrochanteric osteotomy must be considered.—*A. H. Freiberg, Cincinnati.*

KNEE.

42. Luxation of the Semilunar Cartilages of the Knee Joint. By Ferd. Schultze-Dinsberg. *Archiv für Orth.*, Bd. I. Heft 2, 1903.

A review of cases of loose semilunar cartilages. The present report is based on thirty-three cases confirmed by operation, two of which are the author's own.

In the etiology he finds it chiefly in males, in youth, and always following trauma. In twenty-five it was displaced inwards, and in eight outwards. The symptoms are sudden pain after an accident, and a crushing noise. The patient feels something slip in the knee joint. It is characteristic that the joint cannot be extended. He distinguishes old cases from the new. In the new one finds effusion and the joint partly bent. There is an elastic and tender swelling next to the patella. After the swelling of the joint has gone down, the cartilage may be palpated, best when the knee is bent. In old cases there are recurrent attacks of sudden pain following motion, although the pain may in some cases remain permanent.

The treatment may be conservative and operative. Conservative treatment is advised when the signs are not marked and the diagnosis not clear. But in all cases where the displaced cartilage can be demonstrated operation is advised. The operation may be removal or stitching the cartilage in place. The prognosis is for an excellent result.—*Henry Feiss, Cleveland.*

43. Knee-joint Tuberculosis: Expectant Treatment or Operation. By Professor König.

A report in detail of a case of tuberculosis of the knee joint in which an excision was done. A discussion of operative *versus* conservative treatment.

The writer figures on two and a half to three years as the time necessary for cure, if conservative treatment is carried out. We may hope for a little motion, but the treatment is long and expensive; and in the end we may have to resect or amputate, after all. If we operate to remove the disease, with extirpation of the process in or about the capsule, as well as upon the joint facets, we get a stiff leg, which may be shortened; but we can be practically sure of quick result, and the patient soon becomes used to the alteration in walking.

The writer explains the great number of amputations in his clinic as due to the fact that conservative treatment had been used, and that resection for tuberculous joints had scarcely ever been done.—*Henry Feiss, Cleveland.*

44. Growth and Structure of the Lower Femur and Upper Tibial Epiphysis. By Ludloff. *Bruns. Contrib.*, 1903, vol. 38, No. 1.

Normal knee joints of living models from one to eighty years have been studied by means of the X-rays.

Both lateral and antero-posterior views have been taken. By means of these Ludloff proves that some appearances ordinarily considered as pathological—*e.g.*, protuberances on the condyle between two and four years, and the so-called dark spot on the epiphysis—are quite normal.

The following summary is given:—

1. The epiphyseal lines of the lower end of the femur and the upper end of the tibia remain till the age of fifteen. From two and one-half to eight years a very marked formation of bone is noticeable at these points. From seven to fifteen years the tubercle of the tibia develops very rapidly.

2. The middle of the condyles grows more rapidly from two to three and one-half years, the lateral parts in the fourth year, and after that an even growth of both parts.

3. The middle of the condyles appears larger and has less thick spongy bone than the lateral parts. These show stronger longitudinal trabeculæ.

4. There is a space in front in which no vertical structure was observed.

5. During and after the third year this vertical structure becomes noticeable in the lower femur and upper tibial diaphysis.

6. When both condyles have become distinguishable bones, vertical and oblique trabeculæ develop within the intercondyloid notch.

7. During and after the twenty-fifth year the first appearances of atrophy are seen in the femoral epiphysis.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

45. Habitual Luxation of the Patella (p. 452). By Hannover Bade. *Zeitschr. für Orth. Chir.*, Stuttgart, 1903, Bd. XI. Heft 3.

Four cases are reported, three being of traumatic origin and one congenital. From the study of these cases as well as those reported in the literature, the author endeavors to draw conclusions regarding etiology and pathology of habitual dislocation of the patella as well as the symptomatology and treatment.

Regarding the etiology he finds the study of the literature shows decided influence of heredity as regards the disposition to luxation, resembling in this way congenital luxation of the hip. It is the author's opinion that habitual luxation of the patella is never congenital, but that a traumatic factor always exists in conjunction with hereditary predisposition. Congenital luxations, not habitual, are placed by him in a separate class.

The conditions which constitute the hereditary predisposition he considers to be delicate structure of the whole knee joint; great mobility of the patella, produced by laxity of ligaments and muscles, and especially the vastus internus.

Various combinations of these anatomical peculiarities may cause a patellar luxation to become habitual, which was produced by trauma in the first instance. The traumatic element may be a direct external force or, on the other hand, an indirect one, exerting itself upon the knee joint through a particular position of the body. These two may act in conjunction. Direct force seems to preponderate in the production of the original dislocation. The reverse is true regarding the subsequent slippings of the patella.

The symptomatology is carefully discussed, but without presentation of new facts. The same may be said of the treatment. A full bibliography is appended.—*A. H. Freiberg, Cincinnati.*

46. Curvature of the Leg after Knee-joint Resections in Early Life. By Hofmeister. *Bruns. Contrib.*, vol. 37, Nos. 1 & 2.

The disadvantage of resection and arthrectomy of the knee joint in early life are *shortening* and curvature of the leg. The author discusses 125 cases, which could be examined after operation, covering a period of seventeen years. These were:—

18 times (16.8%), absolutely straight legs.
29 times (27.1%), straight to an angle of 165°.
30 times (28%), moderate curving (160°–140°).
48 times (44.9%), serious contractions of flexion (130° and less).

The review of these cases shows that, the younger the children, the more likely were the operations to be followed by secondary contractures. There were no contractures to be observed in children over fourteen.

Three different groups can be distinguished:—

1. That in which the contracture comes on soon after operation, and grows worse rapidly.

2. That in which the contraction begins very slowly, and extends over many years.

3. That which is caused by occasional trauma.

He has found each of these groups many times.

As to the question of etiology the author makes the following distinctions. In the first year there must be a *locus minoris resistentiæ* where a bending might take place. It is to be seen in a pathological softening of the bone in consequence of the tubercular process and also in the physiological weakness in the neighborhood of the epiphyseal lines.

Moreover, the forces at work—namely, the weight of the body and the pull of the flexors—act on these very places.

The author points out the fact that the vertex of the bending almost never corresponds with the epiphyseal line of the tibia, because the upper epiphysis of the tibia has to stand scarcely any pull of the flexors. In this way, even those cases in which contractures occurred without the factor of body weight can be explained.

By means of X-rays the contour should be carefully studied, in order that the bone may be attacked at the point of most extreme bending. Hofmeister advises the division of the flexors and their transplantation into the extensors. This rule holds good for every knee resection before the eighth year.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

47. **A New Method of Correcting Flexion Deformity at the Knee Joint.** By Royal Whitman. *Am. Jour. Med. Sci.*, May, 1903.

Royal Whitman describes this method, which consists of manual manipulation in preference to the use of mechanic appliances. The patient is placed prone upon a flat table, the operator then holds with one hand the head of the tibia firmly against the table, and with the ulnar border of the other begins forcible massage upon the contracted hamstrings, after the method employed (by Lorenz) in overcoming the resistance of the adductors in the operation of reduction of congenital dislocation of the hip. It is suitable to those cases where osteotomy is deemed unnecessary or inexpedient.—*H. A. Wilson, Am. Med.*

SHOULDER.

48. **On the Freeing of the Contractions of the Shoulder Joint.** By Professor Dr. A. Ritschl, Freiburg.—*Archiv für Orth.*, Bd. I. Heft 2.

The usual method of overcoming the contractions of the shoulder joint is partly manual and partly mechanical; and, in the mechanical part, Dr. Ritschl recommends, of the many kinds of apparatus, the one he and Dr. Beely constructed. He considers both the manual and the mechanical methods necessary, but describes also the technique of a purely manual form of reduction, where one pushes the scapula backward with one hand and with the other raises the arm laterally. This has the advantage that one does not have to think of the horizontally fixed arm, and can concentrate his attention more fully on the movement of the scapula. This method can be used in the horizontal as well as the recumbent position.—*D. Townsend, Boston.*

49. **Acquired Elevation of the Scapula.** By Bender. *Muen. Med. Woch.*, No. 9, 1902.

The author reports a case in a girl of twelve years. Bender looks upon this case as acquired and of rachitic origin. He agrees in this with Kölliker, who first described it in 1898. Kölliker considers increased curvature of the body, hook formation of the superior angle, enlargement of the coracoid process, and twisting forward of the glenoid fossa as characteristic of the rachitic deformity of the scapula. The elevation is ascribed to the hook-shaped upper angle clinging to the thorax, the enlarged coracoid applying itself to the clavicle from below.

These characteristics, as well as the absence of other malformations, are held by Bender as differentiating the condition from the congenital variety. The condition is very rare. Gross has described one case in addition to those of Kölliker and Bender. Photograms and radiograms.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

50. Congenital Elevation of the Scapula. By Sick. *Deutsch. Zeit. für Chir.*, Bd. 67.

Sick has observed two cases of this condition which are calculated to throw light on its causation. The first case is a bilateral one. Muscle anomalies were wanting in both cases, but deformity of the bones themselves, combined with incomplete closure of the vertebral canal, was present in both of them. In the bilateral case there was an hereditary element, while the other had the local hypertrichosis so often associated with spina bifida occulta. There appeared no occasion for operative interference in either case. The usefulness of the arms was sufficiently improved by gymnastics.

In the course of a critical examination of the fifty-seven reported cases of congenital elevation of the scapula, Sick finds that about two-thirds of them may be considered due to arrest of development. He leaves undecided the explanation of the remaining one-third, although he is inclined to consider them also as instances of arrested development, though of lesser degree. He holds the trapezius defects, used by Kausch in his explanation, as merely faculative accompaniments of the arrests of development in the spine and scapula, respectively.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

51. On the Etiology of Double Congenital Elevation of the Scapulæ. By H. Mohr. *Org. für Orth. Chir.*, vol. ii., No. 2.

Heretofore only five cases of double elevation of the scapulæ have been observed. In the case of a twenty-two-year-old working-woman the deformity was congenital, but is said to have grown worse. Vertebral curvatures came on later. From an early age she liked to rest her arms upon her back. Her head is bent forward, the shoulder line in the neck region has vanished, and the neck itself is shortened and broadened. The scapulæ, especially the left one, are of abnormal height. An upward motion of the arms is soon followed by a corresponding motion of the scapulæ.

As to the question of etiology, the author thinks the symptoms of the case are explained by the Sprengel theory of "intra-uterine pressure." Muscular atrophy and developmental changes in the scapulæ are to be considered secondary symptoms. The lordosis which has been observed seems to compensate the forward bending of the head.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

FOOT.

52. The Importance of the Tibialis Posticus and the Plantar Muscles in Flat Foot. By Nicoladoni. *Deutsch. Zeit. für Chir.*, Bd. 67.

Nicoladoni was one of the first to express belief in the importance of the tibialis posticus in maintaining the arch of the foot, on account of the way it spreads fanlike over the astragular head into the tarsus. From this he deduced the procedure of grafting half of the Achillis tendo upon the posticus. Observations upon paralysis cases and other considerations also have led him to modify his opinion to the extent of believing the sole muscles to be at least as important in this regard as the posticus. He finds that permanent loss of the tibialis posticus is not of necessity followed by flat foot, while the reverse is true of the sole muscles. This greatly diminishes the importance of the tibialis posticus in etiology, but also the treatment of flat foot. More rational than strengthening the posticus by a graft would therefore be the temporary exclusion of the triceps suræ, which is the antagonist of the sole muscles. For severe cases he proposes open tenotomy of the tendo Achillis, with temporary displacement of the proximal end under the crural fascia to prevent premature union. When, as the result of function, pes calcaneus has developed, the reunion of the tendo Achillis may be undertaken.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

53. **On the Mechanism of Flat Foot.** By S. Petersen. *Von Langenbeck's Records*, vol. 69, Nos. 1 & 2.

There are four different changes in flat-foot joints in consequence of weight.

(1) A bending in the upper ankle joint between the leg and the ankle bone, whereby the head of the astragulus is lowered.

(2) A pronation in the lower ankle joint between the astragulus and the os calcis, whereby the inner border of the foot becomes lowered.

(3) A yielding within Chopart's joint, which brings about a flattening of the whole foot vault and puts an intense strain upon the calcaneal, navicular, and plantar ligaments.

(4) An abduction at Chopart's joint, which is brought about by different motions at Chopart's joint, which causes a flattening of the inner border of the foot.

Flat foot represents a pathological extreme beyond these four physiological motions and a fixation of this position that is a subluxation. It is spoken of, therefore, as a pes flexus, pronatus, reflexus, or abductus. These names at once indicate the clinical symptoms and especially the points of pain, namely: external malleolus, pressure on the calcaneus; centre of the sole, pulling on the calcaneal, navicular, and plantar ligaments; under surface of the heel, pulling of the tendons and muscular attachments.

Flat foot is entirely a weight deformity, caused by a disproportion between the resistance of the supporting structures and the amount of weight working upon it. Rickets and puberty are predisposing factors.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

54. **Flat-foot Support made of Celluloid and Steel Wire.** *Muen. Med. Woch.*, February 17, 1903.

The pains of flat feet can be found in various portions of the foot, and do not in the least correspond to the degree of pes planus. Sometimes the greatest pains are found in cases preserving a good arch. An important diagnostic sign is that the pain is complained of only during walking and standing, and ceases as soon as the patient rests. The cause of the pain lies in the small footbones pressing against each other, and in an excessive pulling of some of the ligaments. The diagnosis of flat foot is, however, only proved by the results of rationally conducted treatment, which must consist of the production of an arch as high as possible. The insole must be made accurately from a plaster of Paris cast, and even then fully 20 per cent. of the soles require additional correction. In cases of valgus positions of the foot the insole must form an oblique plane, and must have a lateral edge to prevent a gliding off of the foot. As best material, he recommends a solution of celluloid and acetone over Längsgurte. Wires are introduced to strengthen the tension of the arch. F. Lange reports very good results. Of 400 patients thus afflicted, only 8 failed to improve, and a number were cured. For good results, however, it is necessary for the patient to be under daily supervision for eight days, for the physician to make the cast and model himself, sometimes also the insole, and for the patient to wear the insole for several years. [E. L.]—*H. A. Wilson, Am. Med.*

55. **Some New Apparatus for the Forcible Correction of Deformed Feet.** By Vogel. p. 508, *Zeitschr. für Orth. Chir.*, xi. 3.

In place of the Lorenz ostoclast three instruments are designed for the correction of pes varus, planus, and excavatus, respectively.

For the first two the apparatus consists of a long handle terminating in a pad of suitable shape, and a curved arm terminating in a padded crutch. The latter is made to approximate the former by means of a screw on the shaft of the handle. The foot is then wrenched into shape, the pad on the end of the handle acting as a fulcrum.

For cavus the apparatus resembles closely in principle the apparatus of Rédard. The heel and ball of the foot resting on pads, a third pad is made to press upon the dorsum by means of a compound lever acting from below. The illustrations are self-explanatory.—*A. H. Freiburg, Cincinnati.*

RICKETS.

56. **The Cause of the Disappearance of Knock-knee when the Knee is flexed.** By Kirmisson. *Revue d'Orthopédie*, March, 1903.

That this occurs no one doubts, but the cause is variously accounted for. After quoting other authors, Kirmisson explains the phenomenon by the fact that the internal condyle of the femur is lower than the external. In knock-knee, due to enlargement of or lowering of the internal condyle of the femur, adduction of the tibia takes place with flexion of the knee. Kirmisson demonstrates this very simply and clearly by a piece of paper.—*Robert Soutter, Boston.*

57. **Prolonged Evolution of Knock-knee.** By L. Ombredaune. *Rev. d'Orth.*, March, 1903.

Dr. Ombredaune considers most carefully and in extreme detail the development of knock-knee with minute description of cases and the method of treatment, especially the comparison of McEwen's and Ogston's operations.

Ombredaune favors Ogston's operation in severe cases, for in osteotomy of the internal condyle the line of the bone is preserved.

Knock-knee may increase after a person has attained his growth. In extreme cases McEwen's operation is less advantageous, and Ogston's more and more indicated as the deformity is increased.—*Robert Soutter, Boston.*

TORTICOLLIS.

58. **"Congenital" Wryneck.** *Zeitschr. für Orth. Chir.*, 1903, xi. 416.

H. Maass has studied forty cases of wryneck in the new-born from the standpoint of their etiology. Twenty-three of these were breech presentations, five were forceps deliveries. He considers the cause of this condition to lie in pathologic changes arising in the sternomastoid, as the result of birth trauma. A few of the cases may be due to infectious myositis in the course of an intra-uterine injury, but this is relatively seldom. [E. L.]—*H. A. Wilson, Am. Med.*

PARALYSIS.

59. **Treatment of Infantile Spastic Paralysis.** Liverpool *Med. Chir. Jour.*, October, 1902.

R. Jones believes a large proportion of children suffering from severe forms of this affection may be transformed into useful members of the community, and enabled to walk with little deformity, many requiring only the aid to be derived from one or two sticks. Active treatment may be needed for nearly two years. Hemiplegia usually affects the arm much more than the leg, and the treatment is less promising than in diplegic cases. If the patient can do more with the hand than at some previous time, success of treatment is assured. When any voluntary relaxation of spasm exists apart from associated movement on the opposite side, treatment is emphatically indicated. Since the dominant deformity is pronation and carpal flexion, the elbow must be fixed supine, and the wrist and fingers fully extended. Prolonged fixation of spastic muscles in a position opposed to their contraction lessens the severity of the spasm. Extension may be discarded in twelve months. If success cannot be predicted at this stage, tenotomy or tendon transplantation should be performed. After operation, over-extension should be practised for a few weeks, and, in order to prevent adhesions, the wrist should be moved about. Movements from simple to complex should be taught. Division of the tendo Achillis controls spasm not only in the calf muscles, but influences spasm elsewhere. In spastic paraplegia the splint should keep the limb in marked abduction. If there are any obstacles to easy extension of the knees, the hamstrings must be divided by open incisions on each side of the popliteal space. The patient should be kept on the abduction frame at least three months. Movements must then be sedulously practised, and finally the little patient can be taught to walk. Much depends on the nurse. The mental condition improves with the physical. Complete recovery in spastic paraplegia is, of course, impossible.—*H. A. Wilson, Am. Med.*

60. Poliencephalomyelitis and Allied Conditions. By E. W. Taylor. *B. M. & S. Jour.*, June 11-18, 1903.

Taylor believes that a large group of affections of the central nervous system exists, provisionally to be regarded as inflammatory, in which may be included encephalitis, poliencephalitis (superior and inferior), poliencephalomyelitis, poliomyelitis, encephalomyelitis, and, with reservations, Landry's paralysis, and possibly myasthenia gravis, and certain peripheral nerve infections. These should be regarded as essentially identical, differing only in symptomatic expression. The evidence for this lies in the simultaneous involvement in individual cases of various portions of the nervous system, a notable example of which is given in poliencephalomyelitis.

We should gain in our understanding of these and other affections if we adopted a classification based on pathologic alterations and on etiology, whenever possible, rather than on clinical symptoms determined by anatomic subdivisions. Admitting a somewhat definite pathologic alteration of the nature of inflammation as a fairly constant factor, we may assume the existence of a common exciting, probably toxic, cause. The nature of this cause is practically unknown, its manifestations are not always uniform, and our final understanding of the distribution and prognosis of these affections must depend, first, upon our knowledge of these exciting causes, and, second, upon the nature of individual susceptibility and resistance. [H. M.]—*Abst. Am. Med.*

TENDONS AND MUSCLES.

61. Osteal Tendon Transplantation. By J. Wolff. *Deutsch. Med. Woch.*, No. 18, 1902.

This article antagonizes the too optimistic contributions on tendon transplantation of late years, and emphasizes the fact that no absolute gain of power is achieved thereby, but only a change in its distribution. Less possible still is it to acquire an absolute increase in power when the muscle which is to supply it is itself paretic. For this reason he holds it better to simply improve the position by shortening tendons or by displacing such as are shortened without considering the functional activity of the respective muscles. In place of the periosteal method of Lange, he proposes the fixation of the tendon in a groove cut in the bone. He reports four cases of paralytic extremities thus successfully operated upon.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

62. Histological Investigations on the Repair of Tendon Wounds and Defects. By Seggel. *Beitr. z. klin. Chir.*, Bd. 37, Heft 1–2.

Exhaustive study of the repair of tendon wounds, including tenotomy, tendon suture, and all the methods of tendon plastics. According to this the development of a new tendon occurs by the organization of the blood poured out from the sheath and the divided tendon. This fills the whole tendon sheath. On the tenth day the inner layers of the tendon sheath consist of long, slender, spindle cells, with marked fibrillation. By the thirtieth day the tendon regeneration is already far advanced, compact tendon bundles growing distally push the loose granulation tissue ahead. By the thirty-eighth day the regeneration extends to the whole cross section. By the fiftieth day the climax of organization is reached, the tissue remaining either unchanged or becoming of looser texture. Seggel concludes that the tendons possess a very marked power of regeneration. This begins, however, only secondarily after the lapse of eight to ten days, and remains for a long time in one state.

The practical application of these investigations is as follows: Long fixation is necessary. Not even before the fortieth day is the use of the tendon rational. In view of the great rôle played by the tendon sheath in the process of repair, its integrity is of importance. However, the sheath has nothing to do with the actual regeneration. For this reason real regeneration may be expected in osteal and periosteal tendon transplantation. Functional use does not seem to make any great difference in the healing process, nor does this seem to depend upon the tension. The same may be said of foreign bodies. The primary *quality* of the regeneration is not determined by these external conditions, but the *quantity* of material produced is. These things must be carefully considered in doing operative work upon tendons for this reason.—*Abst. Zeit. für Orth. Chir.*, xi. 3.

63. On the Technique of Lengthening of Tendons by Tendon Transplantation. By C. Springer. 6 illustrations. *Archiv für Orth.*, Bd. I. Heft 1.

Springer uses the Z method of Beyer in pure equinus cases, and such as are complicated with valgus or varus. His method consists in making a subcutaneous cross-cut with a tenotome half through the tendo Achillis (for valgus position on the inner side, and for varus the outer side) above, and a sufficient distance below on the opposite side, and then by a strong dorsal flexion of the foot a subcutaneous separation of the longitudinal fibres takes place, accompanied by an evident jerk. This method Springer has used as well for torticollis, Duprey's contraction, and joint contractions. After the Z incision is made, the peronei are sewed to the tendo Achillis. He favors the Z method of Beyer because it is easily performed, it leaves a suitable surface wound for the sewing on of the peronei, the whole of the material is used for the lengthening, the whole tendon when lengthened represents half of the original tendon, the portion not lengthened is let alone, and, when healed, the tendon is one-sixth stronger than if done by Priolean's method.—*David Townsend, Boston.*

64. The Elasticity of Muscles and its Importance in Surgery. By Tillman. *Von Langenbeck's Archiv*, vol. 69, Nos. 1 & 2.

The position of equilibrium in the joints depends upon (1) the manner in which those muscles which are in a perpetual state of tension keep the balance, and (2) upon gravity. The elasticity of the muscle puts it always "on the stretch," even when the joint is at rest. This accounts for the fact that the voluntary contractions, in spite of their suddenness, take place gently and gradually, and not jerkily.

Tillman examined the results of Mosso's experiments with a myotonometer by experimenting himself. In agreement with Mosso he found that the muscle, whether passively extended or put on the stretch by the tension of its antagonistic groups, remained in a state of "after extension," while the antagonistic muscles remained in contraction until another active contraction equalized the differences.

Other experiments on the finger muscles of a living subject showed that a disturbance of the "balance position" for a short time (*i.e.*, perhaps twenty seconds) had no positive effect, while after a longer interference the finger had not come back to its normal position even after six minutes. This not only depends upon the "after extension," but also upon the shortening of the antagonizing muscles, there being a residuary shortening, so that the position of equilibrium is attained in less time if the stretching cord has been injured.

The difference of Triepel's results seems to be explained by the fact that the latter experimented on the muscles of an amputated extremity.

The contractibility of muscles under normal conditions seems to show that lasting injuries do not result from a disturbance of equilibrium. It will be different if this contractibility has been lost. For this reason a long-continued fixed dressing has great disadvantages; and, on the other hand, the ambulatory treatment of fractures has had good results.

We learn this same principle from every-day experience, and the same lesson is taught in hospital observations,—*e.g.*, in contracted peroneal muscles, brought on by their exercising a one-sided function for too long a time. Cases of this kind can be cured as long as no permanent pathological changes have taken place.

A continued shortening usually does not cause a disturbance of nourishment, but a continued extension often causes serious atrophy.

From these investigations it is evident that a plaster of Paris dressing in a position of rest should be employed if contractures are to be avoided.

The author defines habitual scoliosis as a disturbance of equilibrium caused by the antagonism of the long muscles of the back, brought on by an incorrect attitude in sitting. Hallux valgus and hammer toe are easily explained by the perpetual one-sided contraction of muscles. The same law is in force in talipes and flat foot, in the former the tibiales anterior and posterior and in the latter the peronei being continuously contracted. It is more difficult, however, to trace genu valgum back to a primary contraction of the biceps.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

65. Advances in the Treatment of Paralytic Deformities. By A. H. Tubby. *The Lancet*, London, March 28, 1903.

Tubby discusses the treatment of paralytic deformities following infantile paralysis or anterior poliomyelitis or the spastic type, hemiplegia, cerebral diplegia, and those due to injuries of the nerves. He describes the method of tendon grafting, giving its history. The rationale is to utilize what is ill-directed voluntary movement, and restore the balance of muscle as far as possible in the affected part, so that the active muscles are not brought to work against the enfeebled ones, thus producing deformities. The brain, he thinks, becomes readily aware of the new conditions of movements by education. The methods and technique of operation are described. He calls attention particularly to the necessity of reshaping the joint surface in old cases and putting the foot or the limb in fully corrected position, and to leave no tension of the reinforcing muscle. Arthrodesis is useful in some ankylosed joint cases; but he does not believe in its propriety in the knee, because the long, straight shaft of the bone so formed is inconvenient, brittle from paralytic changes, and liable to fracture. He would prefer to use mechanical supports with a ring-catch at the knee joint or to transplant portions of the fascia from the sides and back of the joint into the patella. At the ankle, however, it is a valuable measure, because it gives a suitable basis of support. In spastic paralysis the whole secret of success of tenotomy consists in preventing elongation of the bond of union and carefully guarding it until equilibrium of the opposing groups of muscles has been established. If there is fair intellectual development and no fits, it results in nothing else but good physically and mentally, because the more these patients are able to get about and be in touch with others, the more they improve. In cases where it is possible to restore the continuity of the nerve, muscle grafting is the method for overcoming the difficulties; and he reports a case in point.—*Abst. Jour. Am. Med. Ass'n.*

66. On the Position of the Tendo Achillis by Different Positions of the Feet and by Contraction of the Calf Muscles. By Dr. L. Athabegian (Schuscha). *Archiv für Orth.*, Bd. I. Heft 1.

Dr. Athabegian in this paper discusses the literature of the subject, the technique employed in measuring, and the different points measured, length of tibia and tendo Achillis, the relation of the insertion of the tendo Achillis to the ankle joint in the different positions of the foot, and the changes of the relations of tendo Achillis in various positions of the foot and knee. The article is copiously illustrated by drawings, figures, and tables of measurements.—*D. Townsend, Boston.*

MISCELLANEOUS.

67. Clinical and Experimental Contribution to the Study of the Lesions of Traumatic Origin, of the Brachial Plexux (pp. 1–33). By R. Galeazzi. *Arch. di Ortopedia*, Milano, 1903, xx. fasc. 1.

The cases observed were: (1) a syndrome of Déjérine-Klumpke, provoked by a wound of the neck; (2) gunshot wound in the left carotid region with lesion of the vagus and the brachial plexus; (3) luxation, by rotation to the left, of the fifth cervical vertebra with an elevated position of the articular apophysis; paralysis of the brachial plexus of complex type, but generally extreme; (4) luxation, with rotation to the right, of the third cervical vertebra, with its straddling the articular apophysis; paresthesia from compression of the fourth cervical root; reduction; recovery.

The paresis and muscular paralysis may be explained by stretching or direct compression from the luxated vertebræ or by the quite abundant extra-medullary extravasations. In almost all these cases there were symptoms of medullary lesion with those of the radices, so that it is difficult to distinguish the spinal lesions from those of the radices. Few cases have been described where the root symptoms were as clear as in these. From them it would result that it is possible for a paralysis of the roots to arise from the same cause which produces the luxation of the cervical vertebræ; that is, constant compression. This is confirmed by the clinical histories and on observations on the cadavers, and is also evident in the preparations of luxations which the author has been able to observe. The few surgical interventions recorded give encouraging results. The difficulty is in finding the seat of the lesion and determining its degree.

68. Orthopedic Surgical Treatment of Paralysis of the Radial Nerve (pp. 42–56). *Arch. di Ortopedia.* By Alessandrini.

Most cases of paralysis in children come from poliomyelitis. In the statistics of Kermisson, of 179 cases of infantile paralysis, only 16 are referred to the upper articulation. This agrees with other authors. In Alessandrini's cases he found only 2 cases of the superior articulation out of about 70 cases. Much credit is due to Drobnik, who practised a transplantation in a case of partial paralysis of the radial nerve; and Alessandrini has treated this question amply in his communication: "Interosseous Retrograde Transplantation of the Long Extensor of the Hallux in 'Pes Valgus Paralyticus.'"

A boy of five years entered August 19, 1902. Six months old, he had been attacked by an intense fever, after which he lost completely the motility of the arm and right leg. In time there was some amelioration. At present there is a tendency to recline head to the left and roll it to the right; right foot in pure equinus position; the right is pressed to the body and in internal rotation; the fore arm and hand in manifest pronation; extension impossible, some flexion. Operation August 26, 1902: Alessandrini isolated almost all of the longus palmaris with median incision, then passed between the deep flexor of the fingers and the long flexor of the thumb, prepared the interosseous ligament, which he split, avoiding the artery and the interosseous nerve. He then dissected with median dorsal incision the common extensor of the fingers; and, passing between the abductor and the long extensor of the thumb, he prepared the interosseous ligament of the dorsal side. The tendon of the longus palmaris was then cut above the transverse ligament of the carpus, and, passing it through the interosseous ligament, it was fixed in a boutonnière of the common extensor of the fingers above the point where this muscle untwists into its tendons, but quite a space above. The part above the tendon he divided into two, the first of which he fixed with sutures to the tendons of the common extensor of the fingers and anastomosed, the other with the long abductor of the thumb. He took care to avoid the shortening of the tendons, and applied an apparatus which kept the hand hyper-extended and in supination and the fore arm flexed to the arm with that in exaggerated supination. The result was most favorable. The sutures were removed on the twenty-eighth day, and electricity and massage used daily, keeping the hand in super-extension from sitting to sitting by apparatus. The patient was dismissed in about two months with the function re-established *in toto*. A month after the result was maintained.

69. Suture of the Brachial Plexus for Birth Palsy. *British Medical Journal*, February 7, 1903.

Kennedy states that many of these cases recover without treatment. Many, however, fail to recover; and he is doubtful as to the efficacy of electrical treatment in birth palsies, though electricity is of undoubted value for diagnostic and prognostic purposes. He holds that the only rational way to treat birth palsies is that of injuries to peripheral nerves in general. No operation should be attempted until sufficient lapse of time has occurred to determine whether electric reactions will indicate an approaching recovery of the muscles. By the time the child is two months of age, ordinary electric reactions of the child's muscles are sufficiently stable to determine whether the nerve and muscles properly respond. If after this age there be no response to the faradic current, although of course the galvanic current evokes good contractions, it is safer to proceed with operation than to put it off in the further hope of recovery. Comparatively few secondary operations on the brachial plexus are reported, and in most of these the subsequent history of the cases is not given. The author has operated on three cases, but in only one has sufficient time elapsed for recovery to be well advanced. In this case, commencing restoration was first noticed about twelve weeks after the operation, and now after nine months' recovery is almost complete. The operation is described in detail. The author advocates exposing the cords of the brachial plexus, following them in the region where the injury is probable, breaking up all adhesions. If masses of cicatrices have occurred in the injured nerves, these should be resected, and the severed cords approximated by sutures. [A. B. C.]—*Abst. Am. Med.*

70. On the Relation between the Supra-renal Glands and the Growth of the Body to Gigantic Proportions. By Tinser. *Bruns. Ess.*, vol. 37, p. 182.

Of the "blood glands," the thyroid, the hypophysis, the thymus, and the testicle have been known for some time to exert an influence in anomalies of growth. The author now points out that the supra-renal has also an influence of this kind. He reports an observation of his own, and gives a review of other published cases.

In the Tübingen hospital there was a boy of five and a half years, weight 39 kg. (86 pounds), height 138 cm. (4 feet 7½ inches), making him appear to be about fifteen years old.

Post mortem.—A tumor of the left supra-renal gland nearly the size of a child's head was found. The histological examination seemed to show an epithelical neoplasm of the type of malignant adenoma. An extirpation during laparotomy was impossible on account of the numerous metastases involving the inferior vena cava.

The patient had suffered only one year before his death with headache and pain in the left side of the abdomen. The author concludes that the blood glands, as a whole, are in close connection with one another, and may be supplementary to each other, a certain reciprocity existing between them. He thinks that all of them may influence the growth of the body, their hypertrophy having connection with gigantism, and their atrophy with pygmean growths.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

71. **On Angiosclerosis of the Iliac Veins, with a Paper on the Treatment of Temporary Intermittent Limping and on the Group of Symptoms.** By N. Ortner. Published by Stokes & Adam. *Collect. Clin. Papers*, New Series, No. 347.

After the discussion of a case and autopsy in a very interesting way, the author discusses the analogy between these facts and the intermittent claudication of the muscles of the lower extremities (Charcot, Erb, Goldflam). This latter is caused by an ischæmia of the affected parts of the extremities because of disease of the arteries and cramps of the arteries and veins during the movements of the limbs. The author explains the condition of his patient during abdominal digestion on the ground of an ischæmia occurring while the abdomen is engaged in its function.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

72. **A Case of Intermittent Claudication.** Dissertation, Jena, 1902. By Nierling.

The author comes to the following conclusions:—

1. The aspect of intermittent claudication is not always the same. Either the symptoms of sensation or pain and spasm may be the prevailing ones. The whole system complex is not always developed in its entirety.
2. The onset may be sudden, without any previous disturbance whatever, excited, it may be, by cold or by nervous over-exertion.
3. Changes in the foot arteries are not always to be detected by palpation or the X-ray.
4. Standing occupation seems to cause the patients more annoyance than ordinary walking.
5. Syphilis seems not to be without importance in the origin of the disease.
6. The phenomena of intermittent claudication are to be attributed to faulty blood supply of the lower extremities.
7. This is caused not by arterio-sclerosis alone, by the permanent narrowing of the vessel walls. It is very likely that a functional agent, the changing physiological function of the vessel walls, plays a very important rôle.
8. It is not impossible that the disease is a functional neurosis, a symptom of one, or a vaso-motor neurosis of this character.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

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1895. **Dane, John**, M.D. Junior Assistant Surgeon to the Children's Hospital; Assistant Surgeon to the West End Infant Hospital. 29 Marlborough Street, Boston.

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1900. **Elliott, George R.**, M.D. Orthopedic Surgeon to Montefiore Home for Chronic Invalids. 48 East Twenty-sixth Street, New York.

1902. **Fitzhugh, P. Henry**, M.D. Instructor in Orthopedic Surgery, New York Polyclinic; Chief of Clinic and Instructor in Orthopedic Surgery, Cornell Medical College; First Assistant Surgeon in New York State Hospital for Crippled and Deformed Children. 36 West Thirty-fifth Street, New York.

*1887. **Foster, Charles C.**, M.D. Orthopedic Surgeon to the Cambridge Hospital; Visiting Physician to the Avon Home for Children; Visiting Physician to St. Luke's Home for Children. 8 Elmwood Avenue, Cambridge, Mass.

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1892. ERNEST MUIRHEAD LITTLE, F.R.C.S. Eng., Surgeon to the National Orthopedic Hospital. 40 Seymour Street, Portman Square, London, England.

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dren, and Alexandra Hospital for Hip Disease. 30 Bruton Street, W., London, England.

1890. EDMUND OWEN, M.B., F.R.C.S., Surgeon to and Joint Lecturer on Surgery at St. Mary's Hospital; Senior Surgeon to the Hospital for Sick Children, Great Ormond Street, 64 Great Cumberland Place, W., London, England.

1892. ROBERT WILLIAM PARKER, M.R.C.S. Eng., Senior Surgeon East London Hospital for Children; Surgeon German Hospital, Dalston. 13 Welbeck Street, W., London, England.

1890. PAUL RÉDARD, M.D., Lauréat de l'Institute; Ancien Chef de Clinique chirurgicale de la Faculté de Médecine de Paris; Chirurgien du Dispensaire Furtado-Heine. 3 Rue de Turin, Paris, France.

1888. BERNARD ROTH, F.R.C.S. Eng., Orthopedic Surgeon to the Royal Alexandra Children's Hospital, Brighton. 38 Harley Street, Cavendish Square, W., London, England.

1903. W. SCHULTHESS, M.D., Privatdozent für Orthopädie; Chefarzt am Diakonissenhause, Neumünster. Neumünsterallee 3, Zürich V., Switzerland.

1890. NOBLE SMITH, F.R.C.S. Edin., L.R.C.P. Lond., M.R.C.S. Eng., M.D., Surgeon to All Saints' Children's Hospital; Orthopedic Surgeon to British Home for Incurables; Senior Surgeon to the City Orthopedic Hospital. 24 Queen Anne Street, Cavendish Square, W., London, England.

1899. ALFRED H. TUBBY, M.S., M.B. Lond., F.R.C.S. Eng., Surgeon to the Westminster, National Orthopedic, and Evelina Hospitals. 25 Weymouth Street, Portland Place, W., London, England.

1899. OSCAR VULIPIUS, Privatdozent der Chirurgie an der Universität Heidelberg, Dozent für orthopädische Chirurgie, dirigirender Arzt der Orthopädische Chirurgischen Heilanstalt in Heidelberg. Luisenstrasse No. 1.

1890. W. J. WALSHAM, F.R.C.S. Eng., M.B. and C.M. Aberdeen, Joint Surgeon and Lecturer on Surgery at St. Bartholomew's Hospital; Surgeon to Metropolitan Hospital; Consulting Surgeon to Hospital for Hip Diseases, Seven Oaks, and to the Bromley Cottage Hospital. 77 Harley Street, London, England.

1890. GEORGE ARTHUR WRIGHT, B.A., M.B., Oxon., F.R.C.S., Senior Assistant Surgeon, Royal Infirmary, Manchester; Surgeon to Children's Hospital, Pendlebury and Manchester. 8A St. John Street, Manchester, England.

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The American Journal *of* Orthopedic Surgery

I.

CHRONIC VILLOUS ARTHRITIS, WITH SPECIAL REFERENCE TO ITS ETIOLOGY AND PATHOLOGY.

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OF BOSTON.

In a paper published in the Boston *Medical and Surgical Journal* under date of March 19, 1903, the authors undertook to review the literature of Lipoma arborescens, and to supplement this with a report of seven cases which had come to operation. In that series the lipomata were discrete, usually single growths, and would be better described as fatty tumors than as the arborescent lipoma. The pathological investigation of these growths, however, shows that they were undoubtedly degenerated villi and not true tumor formations. They had, however, lost all gross resemblance to the original fringes from which they were developed. As discrete tumors, they gave rise to rather different symptoms than the ordinary synovial fringe.

In the literature there are several authors who believe that the fatty growths found in the joints are true tumors, which push their way in from the outside rather than develop from the inside. The article just referred to, we think, shows that these growths are the result of an hypertrophy of synovial villi. There are, clinically, a great many cases where the

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villi are hypertrophied, and where the isolated, single lipomata are not present. The purpose of this article is to report a study of thirty-three cases of hypertrophied villi,* caused by various conditions, and to show, if possible, the varying etiology of this joint disease, and to put on record the pathological findings observed in these cases.

Etiology.—Local tissue changes are effected in many different ways. In the condition here being considered, it would seem that the causes might be classified under the heads of (I.) traumata, (II.) infections, and (III.) diathetic conditions.

I. Trauma. Under the head of traumata are to be considered (1) direct blows and injuries to a joint and (2) indirect injuries, the consequence of strain to the joint from faulty position resulting in impairment of function. Traumata also result from within the joint itself, as when (3) a semilunar cartilage becomes partially detached, causing impairment of the function and, in some cases, direct violence to the synovial membrane. (4) Loose bodies in a joint, the so-called joint "mice," are capable of causing synovial irritation. (5) Forcible wrenches or lacerations of the ligaments of the joints (either the supporting external or the internal) weaken the joint, cause a relaxation of the ligaments, impair the function, and may thus cause the villous hypertrophy. (6) Flat and pronated feet, by causing strain to the internal lateral ligaments of the knee, are common causes of congested or hyperæmic knees, particularly in stout and flabby individuals, usually women. This condition is not uncommonly an accompaniment of the early convalescence from the confinement of pregnancy (*e.g.*, No. 12),† and is also occasionally met with at puberty in rapidly growing but sickly children, where there is much muscular and ligamentous loss of tone. We have also observed it in a young woman in whom there was some knock-knee and elongation of the patellar tendon. This was accompanied by considerable relaxation of the capsule of the knee joint and thickening of that portion of it on either side of this tendon at the level of the line of the joint. Fibrinous clots cause sufficient trauma to irritate the synovia.

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* Seven have been reported as above stated. The other twenty-six have not before been reported.

† The detailed account of this and the following cases referred to in the text can be found in the *Medical News* for November, 1903 (two numbers). Also the abstract of the literature referred to in the bibliography. This is omitted here for lack of space.

II. Infections. Among infections first of all should be placed (1) tuberculosis. Some tuberculous joints show it more than others. As a rule, those in which the process has shown itself primarily in the soft structures of the joint rather than in the bones illustrate villous hypertrophy most decidedly. Usually, a tuberculous condition can be readily diagnosed clinically, and the aid of the microscope is rarely necessary. The difficulty of the histological diagnosis of these fringes has been demonstrated once in our experience where excision of the knee was performed following a pathological diagnosis of joint tuberculosis. The subsequent history made the diagnosis of joint syphilis much more probable (see Case 2). It has been shown occasionally that tuberculosis has grafted itself upon an ordinary hypertrophied fringe, which has evidently been pre-existent to the tuberculosis. (2) Gonorrhœa, and probably other infective processes, cause villous hypertrophy. The writers have seen this in two cases here reported; namely, Nos. 21 and 22. In the more rapidly developing inflammatory conditions there is not as much villous enlargement as in the more chronic processes, probably because the invasion of the synovial membrane with such numbers of round cells prevents the folding up of the membrane, and the vascular changes are not so conspicuous as in the subacute processes heretofore mentioned. (3) Syphilis. The extensive hypertrophy of the synovial membrane due to syphilis has been mistaken both before and after exploration of the joint for rheumatoid arthritis. In one of our cases the correct diagnosis was arrived at when, one and one-half years after the arthrotomy, the tissues of the knee broke down and typical syphilitic ulcerations appeared. These cleared up with great promptness, and the swelling of the knee almost entirely disappeared under large doses of the iodide (*e.g.*, 2 and 6).

III. Diathetic. Under this head we have rheumatoid arthritis and osteo-arthritis. By the former we mean that polyarticular joint affection of the young adult which is characterized by spindle-shaped swellings of the joints affected, thickening of the joint capsule, and atrophy of the cartilage and bone. By osteo-arthritis we mean that polyarticular affection, usually of later adult life, characterized by hypertrophy and lipping of bone and cartilage, causing what is known as Heberden's nodes when the terminal phalanges are involved, and morbus coxæ sensilis when the hip is involved. Both of these diseases are accompanied by great villous hypertrophy of the synovial membrane, rheumatoid being much the more common.

In several of the cases here reported this was the etiological factor; namely, Nos. 5, 8, 9, and 29. That osteo-arthritic joint involvement, due at times to a general diathetic condition, but often wholly or in part to local trauma, may be a direct cause of villous hypertrophy, is illustrated by the following case (No. 7). The patient had a bony spur, evidently the direct result of an injury in football. This spur was surrounded by a villous hypertrophy. Removal of the spur and fringes certainly produced a complete cure twelve years after the original injury.

Clinical History.—The joints most frequently affected with these forms of arthritis are the knee, the shoulder, the ankle, and the hip. Of these the knee is most frequently involved, probably on account of its exposed position, its function in the weight-bearing of the body, and the nature of its internal anatomy. Its exposed situation makes it liable to external trauma. Its function in the weight-bearing makes it liable to strain, and its internal mechanism is of a nature to be easily deranged. To a less degree these reasons apply to the other joints which have been mentioned. Depending upon the etiology of the arthritis in question, we find the type to be either monarticular or polyarticular. In cases following trauma, either direct or indirect, the lesion is monarticular, except where the etiological factor is bilateral in its distribution, such as pronation of the feet, relaxed knee-joint ligaments, etc.

Of course, where the hypertrophy of villi is due to toxic or inflammatory agents circulating in the blood, or to metabolic disturbances affecting the general processes of the body, one would expect to find a polyarthritis, and this is usually the case. In looking over the history of these cases, it is noticeable that a considerable period of time has passed since the beginning of the trouble. This is particularly true of the traumatic cases. In these an interval of years rather than months or weeks is the customary rule. The explanation of this is probably that, until fibrous changes of considerable extent take place in these fringes, they do not simulate foreign bodies as they do subsequent to such fibrous change. In the early stage of passive congestion they are soft, and are readily disposed of in the act of moving the joint, and so do not give rise to symptoms other than swelling and a certain amount of discomfort and inconvenience upon first rising from a sitting position. Where some diathetic cause has been in operation, the fringe development has undoubtedly been so insidious that the patient cannot give a definite date to the onset of the joint symptoms. Here, then, we do not ordinarily find so long an interval between the onset of the trouble and the development of the joint fringes. In many cases there have been long intervals without symptoms referable to the joint. Such is usually the history where the primary cause was a trauma, giving rise to symptoms which were more or less temporary, with subsequent secondary traumata and lighting up of fresh symptoms. The symptomatology of this form of arthritis is often very indefinite, and readily accounts for the lack of attention hitherto paid to the condition. There is sometimes an immediate onset of symptoms directly associated with the trauma, but more usually the symptoms which are due to the fringe are distinctly different in the mind of the patient from those which resulted from the trauma itself. The symptoms which are directly referable then to the presence of the fringe are these: a more or less frequently recurring synovitis which perhaps never wholly disappears, a sensation of pinching something between the component bones of the joint in the act of walking, at first occurring rarely, but becoming progressively a more or less constant symptom during the use of the joint. There is also a more or less local swelling of the membrane of the joint, usually of that portion which is below the patella and on either side of the patellar tendon. Pain is not ordinarily present when the patient is quiet. Sometimes this radiates down the leg almost to the ankle, and is usually of a sharp incisive character. The normal passive motion of the joint is not interfered with in flexion, and only occasionally is extension somewhat limited. When this occurs, it is usually due to the hypertrophy of those few villi which arise from the alar ligaments. Locking of the joint almost never occurs, as it does in the case of the dislocated cartilages. Although the patient is conscious of the presence of a soft body between the articular surfaces, he is usually able to flex or extend the joint at will. What has just been said regarding the symptomatology applies principally to the traumatic cases. Those which are due to a definite arthritis of toxic or diathetic origin differ in that the swelling is more symmetrical, is rarely or never confined to any one quarter of the joint, is accompanied much less frequently by a true effusion. Where the hypertrophy of the synovial membrane is general, the joint often appears to be filled with fluid. The patella seems to float, fluctuation is easily obtainable, and one is frequently surprised on opening the joint to find no excess of fluid. Under these circumstances one finds a very large mass of soft pliable fringes, which protrude from the joint as soon as the capsule is opened. They look and feel in many cases like masses of small angle worms. In the cases dependent upon a general diathesis, as rheumatoid arthritis, contracture of the joints, spasm of the muscles, and other evidences of a true arthritis are usually found. Such symptoms do not commonly accompany the villous hypertrophy due to trauma. Measurements made will show an increase in the size of the affected joints which, in cases of traumatic origin, is usually either below the patella or above the patella only. In the other types the swelling is more diffuse, and the enlargement of the joint is noticeable throughout its entire extent. Pain on motion of the joint is not commonly noted, except in the cases where there is a definite arthritis of diathetic origin. Tenderness, localized over the fringes which are most readily palpable, is not uncommon, and is, in fact, usually present where the fringe is of any considerable size.

Differential Diagnosis.—In diagnosing this condition from others, few affections are to be considered. It cannot always be determined which of the several possible causes is responsible for the trouble. Usually, in the presence of any obvious joint disease, the explanation of existing fringes is not far to seek. Defects in the standing position of patients productive of joint strain at the knee should be looked for to explain symptoms such as have just been enumerated. The history of trauma should be inquired into. It has usually been sufficiently severe to attract attention. The general conditions occurring in weak and debilitated people which cause general and local muscular relaxation must also be borne in mind.

With these general observations in mind, it remains to consider what other conditions may cause these symptoms. Early synovial tuberculosis must be considered. The patients' general condition in these cases is usually poor, as is also the case in rheumatoid arthritis. Tuberculosis, however, is monarticular, while rheumatoid arthritis is polyarticular in a large majority of cases. It is in these early tubercular cases that explorations are indicated after other methods of diagnosis have been exhausted.

The history of a gonorrheal affection accompanied by definite joint involvements is suggestive, but a simple history of a gonorrhœa at some more or less remote period is of no significance. It also should be borne in mind that the infective arthritic processes are possible excitants to rheumatoid changes, and that such a history, with rheumatoid appearances in the joints on gross examination, may indicate the subacute or chronic state of an infective process, or the early stage of a rheumatoid. A histological examination would probably clear up such a diagnosis.

A dislocated or partially dislocated semilunar cartilage may cause confusion, and it is sometimes impossible to establish the diagnosis. As a rule, there is not the locking of the joint in a partially extended position in the villous hypertrophy, as there so frequently is in the case of the cartilage; and the history of the dislocated cartilage is suggestive. The difficulty arises where the cartilage was but slightly displaced, and was not accompanied by the customary trauma. In three cases in this series there were found hypertrophied synovial fringes, evidently due to the derangement of the joint in consequence of a partially detached cartilage which had not been definitely diagnosed (Nos. 15 and 26). An habitually recurring synovitis will frequently be found to be due to the existence of a fringe or fringes. Any simple synovitis that cannot be explained away on some reasonable ground should cause suspicion. In this series is one case of intermittent hydrops that was full of well-developed fringes. The hydrops was not materially benefited for any considerable length of time by the removal of the greater part of the fringes, so that this condition was probably simply a coincidence in the process. Intermittency in the accumulation of a synovitis would lead one to be rather less sanguine as to the probable benefit of an arthrotomy in a villous arthritis thus complicated, and should be borne in mind in the differential diagnosis. The cases in which malignant disease, as sarcoma, finds its starting-point in the villi of a joint are so rare that they must be regarded in the light of medical curiosities. Of monarticular affections osteoarthritis not uncommonly causes a villous arthritis. This is usually accomplished by the trauma inflicted upon the joint by the osteo-arthritic spurs, which develop about the condyles and along the border of the patella. These irritate the synovial membrane, and cause the development of fringes in their neighborhood. These spurs can usually be recognized on palpation and almost always in the skiagram.

Treatment.—The treatment varies with the causation of the arthritis. Very many of the early cases, when caused by pronated or flat feet, where the condition in the knee joint is that of a passive hyperæmia due to the malposition, are promptly and permanently cured by resort to a proper support for the foot. This must be worn for a considerable time after the subsidence of the joint symptoms. Adhesive plaster strapping tightly applied over the front and sides of the knee to compress the synovial membrane and lessen the chance of its being crowded together and pinched by the action of the joint is helpful in relieving the symptoms and causing the fringes in some cases to shrink up. This is particularly true in the cases where the condition results from general loss of tone in the joint capsule or from faulty attitudes in standing and walking.

Where the villous hypertrophy is due to some diathesis, such treatment can be only palliative. In this last class of cases, however, the presence of the fringes is a source of irritation and injury to the joint, and here, as in all other cases, where strapping, bandaging, and correction of existing causative defects in the feet are not effective, operative measures should be taken. Prolonged fixation in plaster or other splints does not accomplish any permanent good, and long-continued conservative treatment is not to be recommended. The fact that the individual and not simply the joint is being treated should not be lost sight of, and general tonic treatment, massage, and exercises are indicated in the appropriate cases. In the osteo-arthritic cases, of course, any stirring up of the joints where spur formation is causing the villous hypertrophy is to be avoided. This applies to massage as well as to exercise, and here partial fixation in removable splints of leather is at times effective in quieting down the process. In such conditions as muscular and ligamentous laxity, some stages of the rheumatoid process, and the later or convalescent condition of the primarily infective cases, massage, exercise, and such measures are effective, and should be used. Here, also, local stimulating treatment by means of the alternate douche of hot and cold water is very beneficial. In the more acute stages of the rheumatoid fringes, hot fomentations and rubber dam worn next the skin at night give the patient more comfort, although the nature of their therapeutic value is uncertain. Dry heat at high temperatures is of little value.

The therapeutic treatment of the underlying condition in those cases, caused by rheumatoid and osteo arthritis, is most unsatisfactory. The acute rheumatic remedies should be used very sparingly and never continuously. The same is true of the sedatives and soporifics. Careful nursing, fixation of the affected joints during the acute stage, and general tonic treatment give the best results in the long run. Diet should be plain, but plentiful, and restricted only by the patient's capacity for digestion. These details are gone into here for two reasons. Many practitioners who have overlooked the fringes, because they have not examined their patient's joints, regard the symptoms arising from these conditions as rheumatic, and treat them accordingly. The result is that the patient's general health becomes undermined, and if, perchance, the villous arthritis is rheumatoid in character, the worst consequences are to be expected. On the other hand, rational therapeutics has its place, and should be thoroughly followed.

Operative Treatment.—Failing in the relief of these conditions by the before-mentioned conservative measures, we have to consider the radical or operative procedures. These are to be undertaken when other treatment has been tried and failed, or when the condition is such as obviously could not be relieved by conservative methods. It offers the quickest and, in the long run, the most satisfactory results. It is not attended by any particular risk, and is rational in every way, especially in the cases of traumatic origin. Under the modern technique one thinks very little of the risks of infection. In this series of cases this has not occurred. With proper after-treatment there is no serious probability of a stiff joint, and restoration to normal motion and complete function is usually speedy and uncomplicated. There is practically no risk of weakening the joint because of the incision through its fibrous envelope, and there have been, so far as observed, no late sequelæ which tend to make one hesitate to operate. Where the villous arthritis is simply an evidence of a chronic general disease, the purpose of the operation differs from that in the cases in which the hypertrophied villi are the result of an injury or of some acute inflammatory process. To reach these fringes in the knee joint, which is the joint most commonly explored, it has been found that a lateral incision about 5 to 6 centimetres long over the inner aspect of the joint, extending a short distance below its lower border, affords an opportunity to investigate a considerable portion of the synovial membrane by direct inspection, and what cannot be seen can be explored by the finger. Familiarity with the "feel" of the fringes makes one quite expert in detecting them where they cannot be seen. If in this way it is demonstrable, or presumable even, that more fringes are situated on the outer side of the joint, a similar incision is to be recommended over that aspect. In extreme cases, usually due to some diathesis, where there is extensive hypertrophy of the villi, we think that it is reasonable and proper to connect the two incisions which are usually made for exploratory purposes at their lower extremities, and in doing this to divide the patellar tendon close to its insertion into the lower border of the patella. On turning back the flap, the entire joint cavity is exposed, and the dissection of the villi is much more easily accomplished. The objection to this procedure is that the convalescence is necessarily prolonged because of the six weeks or more of immobilization of the knee required after division and suture of the patellar tendon. In several cases where joint tuberculosis has been diagnosed early, excision of the parts of the synovial membrane attacked by the disease has been attempted, and this incision has given admirable opportunity for the removal of the disease, while the functional results have been extremely good. This, too, in spite of the fact that it was necessary, because of the nature of the disease, to protract the convalescent treatment very materially.

The removal of these villi is not ordinarily accompanied by any recurrence because the cicatrization of the denuded portion of the capsular surface causes the entire membrane to shrink, and scar tissue does not readily lend itself to villous hypertrophy. Thus, even in the diathetic cases, where the removal of the fringes is performed for the sake of freeing the joint from their irritative action, good results may be expected both locally and generally, through the improved function of the joint and the consequent influence which this improved function has upon the general condition of the patient.

Sometimes, on account of the vascularity of these fringes, some difficulty is experienced in checking the hemorrhage. It is impossible to ligate all the small bleeding vessels inside the joint, and the cauterizing effect of hot water is necessary. The only bad result attributable to our technique which has occurred in this series of cases was one in which the water supplied was so hot that the synovial membrane was scalded, and sloughing took place. This case is still under treatment, and we are trying to secure motion in the joint with apparently satisfactory results.

The capsule is closed with interrupted silk sutures, usually four or five in number, placed some distance apart, so as not to close too completely the synovial capsule. They also include the fibrous tissue. The skin incision is closed with either interrupted silkworm gut or subcutaneous continuous silver. In the majority of cases silkworm gut was used. In regard to dressings we have had experience both with fixation and with soft dressings alone. All our early cases were put up first in plaster of Paris dressings, which were kept on for at least a week.

In several recent cases immobilization was not practised, a soft dressing only being used. Joint effusion was no more marked, the patient suffered no increase in discomfort, and motion was apparently obtained more quickly in these cases.

Post-operative Treatment.—The post-operative treatment is fully as important as any which has preceded it. Unless there are indications to the contrary, dressings are not disturbed for one week, at which time the stitches are removed, and passive manipulation is begun at once.

The cases vary considerably with respect to early restriction of motion, and they seem to vary directly in proportion to the size of the bases of the pedicles from which the fringes depend. In other words, the more vascular the pedicle which connects the villus with the general synovial membrane, the more extensive is the denuded surface after the fringe has been excised, and, where there are a number of these broad denuded areas, adhesion seems to be more likely to occur. These adhesions, however, are very slight, and are readily overcome in most patients without an anæsthetic, and, when this is necessary, but one, or at most two, manipulations under gas are required.

Passive manipulation by the patient and active manipulation by the physician should be practised daily during the second week. At the end of this time motion is usually restored to ninety or more degrees. It is then safe to allow the patient to begin to bear weight on the leg, and to encourage him to walk, supported somewhat by a crutch or cane and wearing a compression bandage, such as is made from Shaker's flannel. Daily hot and cold douching stimulates the joint, and facilitates its restoration to normal functional activity.

Some soreness and stiffness persists often for a longer period than this, but, ordinarily, at the end of the second or third week the active treatment of the joint should be practically completed. Subsequent visits are usually unnecessary.

Pathology.—The appearance of these hypertrophied joint fringes ranges within wide limits. The smaller are of a reddish-gray to purplish color, of delicate dendritic appearance, attached to the synovial lining of the joint by an extremely slender and delicate pedicle, and are present in great numbers, presenting a fungus-like appearance over the entire membrane. Their consistency is very soft and yielding, and their vascularity is especially marked.

In the other extreme are the large, irregular, coarsely lobulated, yellowish fatty masses of 4-5 cm. in diameter, often glued by constant inflammation to the synovial lining over a wide area, though the original pedicle is generally to be distinguished. These are usually but one or two in number, and occupy the greater part of the joint cavity. More rare are the fatty masses without any trace on inspection or palpation of fibrous tissue, and the masses of hyaline necrotic tissue or of connective tissue infiltrated with bone or cartilage cells. Between these limits are all shapes and sizes, the pedunculated appearance and rich supply of vessels being the most common characteristics.

On section, the tissue even in the larger growths is very rarely of a true fatty consistency. There is always a resistance characteristic of the presence of fibrous tissue in some amount, which in a few instances passes into the gritty solid resistance of bone and cartilage.

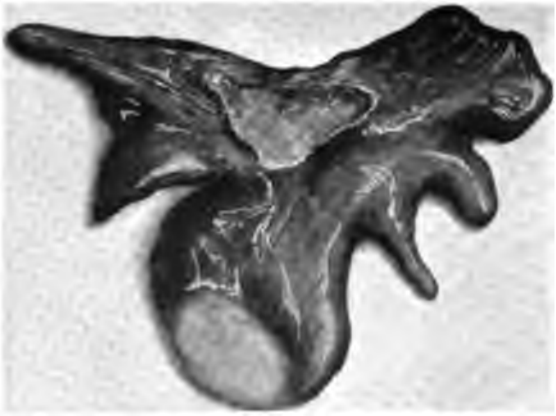

Fig. 1. Arborescent lipoma. Actual size.

A microscopic examination of the smaller* growths shows the pedicle to be composed of numerous parallel blood vessels imbedded in a mass of small round-celled tissue, with a thin endothelial lining. Following this to the enlarged bulbous end, the periphery of the growth is found to have the same nature. The cortical portion is composed of an endothelial lining, consisting of a single layer of cells, and a connective tissue groundwork infiltrated with the small round cells characteristic of a chronic inflammatory process, often arranged in definite whorls, somewhat resembling a tubercle. But these whorls never contain the characteristic round epithelioid cells, the giant cells, or the necrotic areas, characteristic of tuberculosis. Minute blood vessels are very numerous. A short distance from the outer border of the fringe, fibrous tissue begins to predominate over the small round cells, and this shortly gives way to adipose tissue of normal appearance,

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* *Vide* Fig. 6.

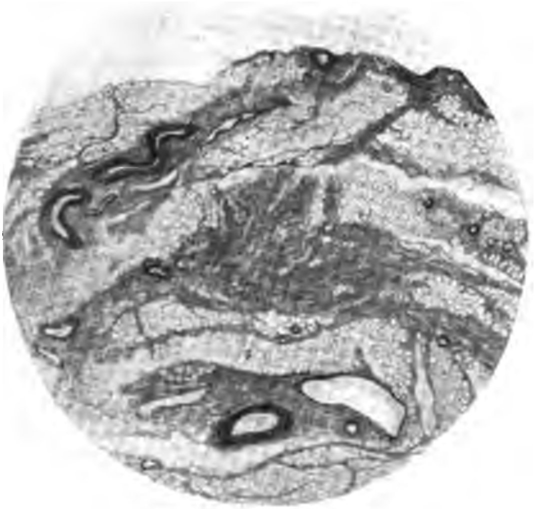

FIG. 2. Section of Fig. 1.

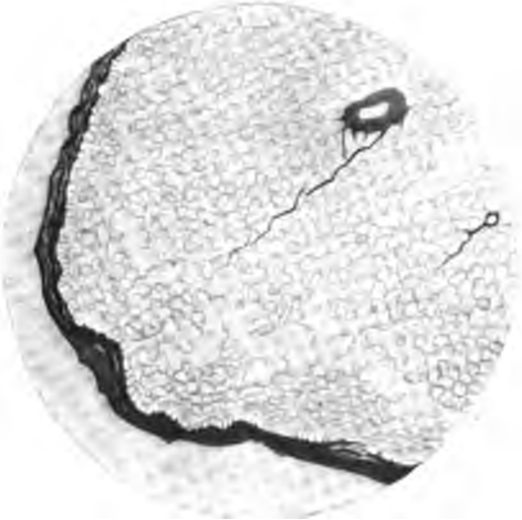

FIG. 3. Normal lipoma for comparison with Fig. 2.

which constitutes the remainder of the growth. This is not pure adipose tissue, however, for at intervals appear striæ and irregular collections of more or less normal connective tissue, usually associated with the vessels. Although usually these bands are definite and stain deeply, yet often they stain but feebly, and show evidence of granular necrosis. The vessels, very numerous throughout, show, especially in the central portions, marked endarteritic changes, and, where the adipose tissue is most abundant, the vessels are very small, and their lumina are very frequently obliterated.

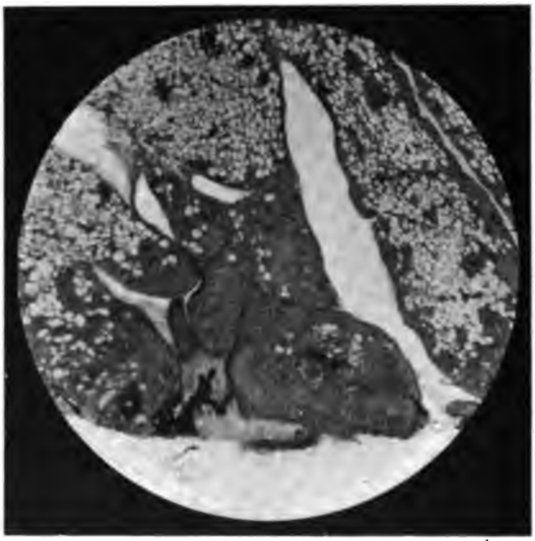

FIG. 4. Shows typical fringe formation, marked round-celled infiltration at the tip, with fatty base.

These same appearances hold true even in the largest fatty growths, save that in these cases the peripheral layer of small round cells is much thinner and at times almost entirely absent, while the areas of unbroken fatty tissue tend to increase in extent. Occasionally, and in apparently very chronic cases, the specimen shows a mass of unbroken fatty cells, with no patent blood vessels, though occasionally traces of their walls which have undergone hyaline necrosis are to be distinguished. Here, too, are found irregular patches of former fibrous tissue which have become hyaline,—a condition which is universal throughout the fringe in rare cases of many years' standing.

Bone and cartilage cells were found in but one case, but here they formed definite areas of large size. In no case are any signs of tuberculosis apparent, nor is there any tendency to the formation of malignant new growths, though instances of the former are plentiful and of the latter not unknown in the literature.

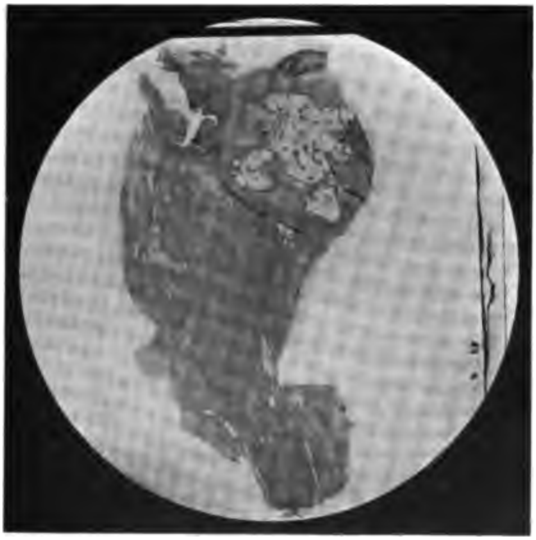

FIG. 5. Shows islands of cartilage and bone developed in a synovial fringe.

Prognosis.—The question of the prognosis in these cases cannot, we think, be definitely spoken of as yet because of insufficient data on the subject. It must be borne in mind also that, in giving a prognosis, account must be taken of the cause of the villous hypertrophy. The operation cannot be justly condemned as a surgical procedure because a latent general disease has been overlooked by the operator. In the traumatic cases, and those due to faulty weight-bearing, there is every reason to look for a good result, provided, of course, that in the latter case the defective mechanics are corrected.

Neither is it fair to expect or to lead the patient to expect a cure of rheumatoid arthritis to follow the simple removal of large masses of fringes from the knee joints. In this and allied diseases causing villous arthritis the most that can be held out by way of encouragement to the patient is the hope that, by improving the function of a large joint whose integrity is vitally concerned in promoting the individual's general welfare, the individual may put himself in a position the better to overcome the diathesis. In many cases this can be accomplished, in others it cannot. So far as the cases here reported can afford any basis for a prognosis, bearing the before-mentioned circumstances in mind, and remembering the comparatively short time which has elapsed since the date of operation on the first of the series, it seems fair to claim that in the traumatic cases the prognosis is very good, whereas in the diathetic cases it is impossible to obtain very brilliant results. The long standing cases are apt to suffer from a condition of marked joint relaxation, which requires some after treatment tending to the strengthening of the muscles and shrinking up of the capsule; and this takes time. In one of our cases, where the fringes had developed directly beneath the patellar

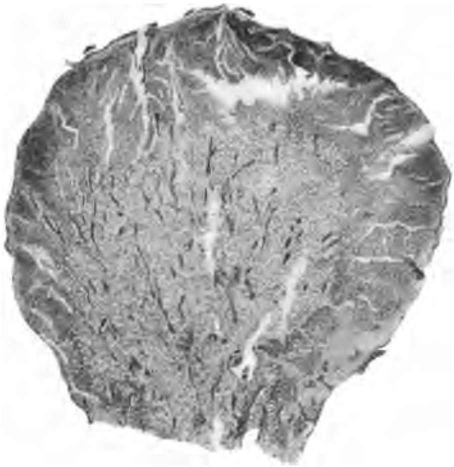

FIG. 6. Longitudinal section through a fringe, showing the vascularity, fatty centre and infiltrated border.

tendon, they had attained such size as to crowd the tendon forward and prevent its coming perfectly straight in extension of the leg. This patient has had some difficulty in recovering complete voluntary extension, apparently because of this elongation of the patellar tendon. Abbott, in a recent article, speaks of a paralysis of the quadriceps extensor which has not been observed in our cases.

Conclusions.—1. Chronic villous arthritis is not a disease of itself, as has been claimed by some authors. It occurs associated with chronic diathetic disease which involves other tissues than the synovial membrane of the joints affected, but it is representative in such cases of the same pathological changes which subsequently obtain in the other structures of the joint. The two principal diatheses which cause this are rheumatoid arthritis and osteo-arthritis. The villous changes in these two chronic conditions are to be regarded as symptoms of a general condition, and not as an entity in themselves.

2. Traumatism, entirely apart from any diathesis, is capable of giving rise to an hypertrophy of villi, and this hypertrophy is usually a local one in the part of the membrane directly or indirectly injured. The type commonly goes on to a dense fibrous growth, which keeps the joint in a constant state of injury through its traumatic effects.

Traumatism, associated with an osteo-arthritic diathesis, is frequently the excitant of local synovial hypertrophy; but the synovial changes are apparently more the result of the trauma than of the stirring up of the diathesis.

3. Stout, flabby adults, with pronated or flat feet, are more liable to the type of fringe which undergoes fatty degeneration with a minimum amount of fibrous change. This condition is sometimes associated with pregnancy, the tissue relaxations of nervous prostration, and the "soft" condition of so many rapidly growing and sickly children at the period of puberty.

4. Alteration in the mechanics of weight-bearing is not, as has been recently stated, the prime cause of this condition in many of the knee cases. It is very frequently a contribut-

ing factor, and as such should be given its full weight when questions of treatment arise; but it is extremely doubtful if simple flat foot or pronated foot without some more fundamental tissue change can account for this condition.

5. The operative treatment in the properly selected cases gives eminently satisfactory results when undertaken with an understanding as to what the procedure contemplates. Conservative treatment, when carried out properly in suitable cases, which comprise, however, only a small class, gives equally good results. The main thing is to be able to discriminate between the classes.

6. Judging from the pathological findings, the condition is the result of a chronic inflammatory process of whatever cause, which, by acting upon the normal villi of the synovial membrane, causes their hypertrophy, together with a consequent great increase in the number of their blood vessels. This condition becoming chronic, due to the continuance of the toxic cause or to intermittent and slight trauma, the vessels are unable to supply the needs of the new tissue, affected as they are themselves by the inflammatory process.

The result is their gradual endarteritic obliteration with the almost complete loss of blood supply and the disappearance of the normal fibrous tissue, which either undergoes necrosis and hyaline degeneration, or disappears, leaving in its place tissues which can be nourished by a very limited supply of blood, the adipose being the most common form. In this necrotic condition, separation of the pedicle and the formation of a loose joint body can easily occur.

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II.

A TREATMENT OF OSTEITIS DEFORMANS AND OSTEO-ARTHRITIS.

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In recent times many attempts have been made to increase the knowledge of osteitis deformans and osteo-arthritis. These studies have mostly dealt with the pathology, and more recently the physiology, of these diseases; but it will be observed that all writers have had little or nothing to offer in the way of treatment. I wish to offer the following cases simply for the apparently favorable results of treatment:—

CASE 1.—W. H. Overseer in a mill. Three years ago he first noticed a slight lameness and stiffness of the left leg and knee. During the first three years he had this trouble constantly, being somewhat better in hot weather and worse on exposure to cold. He had been treated for rheumatism about a year without results.

Physical Examination.—Well nourished and developed. Heart and lungs negative. The left hip is slightly sensitive to pressure, and there seems to be some thickening about the joint. There is good motion in flexion and rotation. There is an atrophy of 1½ inches in the left thigh. There is also ½ inch shortening. There is marked resistance and limitation to hyper-extension.

In order to clear up the diagnosis, if possible, 4 milligrams of tuberculin were injected April 18, 1901, with no reaction. On April 22 6 milligrams were injected. Again no reaction. At this time the diagnosis was fairly certain of an osteo-arthritis or beginning osteitis deformans, and the following treatment was begun. The skin about the hip and down the thigh was superficially cauterized every month. In the middle of the month a small blister about 1 by 2 inches was produced in the lumbar region, on the side of the spine corresponding to the diseased hip. This treatment was continued at these regular intervals for about a year. When he first came under my care, he was in bed, but I allowed him to return to his work in the mill at the very beginning of treatment. Here he was on his feet continually every day. Improvement began with the very first

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treatment, and continued uninterruptedly until the end of the year. He could then walk with perfect comfort, and there was absolutely no pain. It is now about a year since the cessation of treatment, and there have been no return of symptoms, and the disease has not attacked the other hip or any part of the body.

Case 2.—A man of about fifty years of age. Occupation, clerk and book-keeper. This man has always been perfectly healthy. His occupation has kept him on his feet most of the time, and he has been in the habit of taking long walks Sunday, twelve or fifteen miles. Twelve years ago he strained the left knee in playing ball, and he thinks the leg has never been quite straight since. In 1898 he had inflammation of the periosteum below the knee, which lasted for two or three months, and was followed by perfect recovery. His attention was called to his present condition by his friends, who told him he was walking lame. For three or four weeks before coming for advice he had complained of pain, mostly in the hip, and sometimes slight twinges of pain up and down the leg.

Physical Examination.—There was some thickening around the trochanter, and the leg measured ½ inch shorter than its mate, due to the curvature of the femur. An X-ray plate revealed a typical osteitis deformans.

First treatment was July 20, 1902, when the skin about the hip and down the thigh was superficially cauterized in many places. August 7.—Pain much relieved after first treatment. He now walks five and six miles Sundays with comfort, which he had formerly been unable to do. In the middle of each month the spine was blistered, as before described. October 15.—Has been on a hunting trip for three or four weeks, and has been on his feet as much as any of the party. He walked twenty-five miles in two days, and the pain has practically disappeared. Feb. 23, 1903.—He is in excellent condition, there are no symptoms, the disease has not attacked any other joints, and at present (May, 1903) remains apparently cured.

Case 3.—C. F. I. Age, forty-two years. Has been a motorman for the past four years. He came to me first June 25, 1902, saying he had never been sick at all until Feb. 4, 1902, when the knee was somewhat painful. This lasted for about a month, during which time he was not laid up, and the recovery was perfect. He then went to work on the car for two days, when in March he suddenly fell in the street with excruciating pain in the hip and thigh. He was laid up in bed for two weeks, and has been unable to work since.

Physical Examination.—The man walked into my office with great difficulty, using a crutch and a cane. At every step a distinctly audible squeak was noticed. There was motion in flexion of 45–50°, and on manipulation this same squeaking could both be felt and heard. Rotation was one-half. Every motion caused discomfort, and considerable muscular rigidity was present. The right leg was ½ inch shorter than its mate, due to the curved femur. An X-ray plate showed the presence of a typical osteitis deformans. The hip and thigh were superficially cauterized, and the spine was to be blistered between treatments, as usual. July 25.—Patient reports himself somewhat improved, and notices that the squeaking is less and the muscular rigidity diminishing. September 22.—Has been on his feet quite a little, working in a garden, getting about very comfortably with a cane. A slow improvement continues. Oct. 27, 1902.—At this time, four months only from the first treatment, he is a great deal better, and for the last two weeks has been at his customary work (motorman) nine-elevenths of a day. A slight squeaking still remains. May, 1903.—Is working every day, and the disease is apparently quiescent.

CASE 4.—R. R. Male, age thirty-seven years. In 1898 he was troubled with renal colic, and first complained of pain in knees. This gradually grew worse, until he could not get his legs into a comfortable position at night. In 1900 a bowing of the legs began, which has gradually increased until the condition is one of well-marked bow-legs. During the summer of 1902 he had night sweats, and, when first consulting me, he weighed one hundred and thirty-five pounds, which was seventeen pounds less than three years previous. Also at this time he was suffering severe pain, and had to cross his legs in order to get to sleep. An X-ray plate showed an osteitis deformans. Aug. 16, 1902.—Both hips and legs down to the knee superficially cauterized, and patient instructed to blister spine, as before described. Sept. 21, 1902.—Has had only one bad day since the first treatment, and on September 20 says he walked two (2) miles in the country, which he could not have done any time during the last two months. Although here was improvement, and as much as in any of the cases after only one treatment, yet he never reported again, and, when I met him on the street some time afterward, he said the treatment was too harsh, and that the discomfort from the cauterization kept him awake for three or four nights; and he never came back for further treatment.

Of osteo-arthritis without involving the shaft of the long bones there is one case:—

Case 1.—Osteo-arthritis of the right shoulder in a man of fifty years of age. This trouble began with pain and stiffness of the shoulder, being worse at night. The disease increased in severity, until he was unable to lie down in bed, but was compelled to sleep sitting up. This had been going on for about six months, until when he first consulted me, Sept. 1, 1901, the arm was held rigidly by muscular spasm, and the slightest motion caused excruciating pain. The disease was apparently rapidly progressing, and was a case of sleepless nights spent in a chair and extreme pain all day. Sept. 1, 1901.—The skin all about the shoulder was superficially cauterized, and this was repeated at monthly intervals, while midway between these treatments a small blister was applied just to the right of spine at the lower end of cervical region. These applications were continued at regular intervals for a little less than a year. Improvement was immediate from the very first treatment, and continued steadily until he considered himself well. At first he could scarcely move the arm at all, and then only with great pain, while at the end of treatment there was no pain at all. The motion is now free in all directions except elevation above a right angle with the body. Here the bone thickening apparently interferes.

I realize that only a few cases are reported, but the results are surprising enough to warrant a continuance of the treatment in similar cases.

DISCUSSION.

Dr. Goldthwait said that it was a well-known fact that any counter-irritation over the seat of the active process was followed by relief, and that also there were periods of quiescence in the disease which might last several years, and then the disease become active again. He had had one case in which an incision had been made by another physician before the patient had come to him. This gave great relief, but did not of course permanently check the disease. He did not think any counter-irritation would materially change the course of the disease. Probably all the members had seen cases as striking as those reported, in which the patient had been crippled, and in which it had been possible by strapping or some other line of treatment to enable the patient to work. With regard to the case of supposed osteo-arthritis of the hip he could not help questioning the diagnosis. There was no limitation of rotation, and the other motions were free. In osteo-arthritis of such long standing, rotation would be mechanically impossible. Possibly the case was one of peri-arthritis or of ilio-psoas bursa. He was inclined to accept the latter view. The description of the shoulder case presented a very clear picture. In the active stage of osteo-arthritis the disease attacked the anterior part of the humerus at the point of attachment of the anterior portion of the capsule of the joint, and anything which caused hyper-extension of the shoulder, such as occurred during sleep, gave rise to pain. He recalled one very striking case in which the patient was taking a grain of morphine at night, and yet by simply putting a pillow under the elbow, and preventing the drag upon the anterior ligament, he was enabled to sleep all night without morphia. Counter-irritation or anything which increased the circulation at this point would relieve the symptoms without question. Cauterization, blistering, hot water, or anything else which tended to increase the circulation, gave relief, provided it did not cause irritation of the part actually diseased. For this reason massage aggravated the condition by causing irritation.

Dr. **Peckham** said that, if the case had been one of ilio-femoral bursa of such long standing, it would not have been cured spontaneously in that way. He had another case of osteitis deformans occurring in a physician, a patient seen by Dr. Goldthwait. Early in the history of that case the man had an X-ray burn over the anterior surface of the thigh or in the groin. The type of the disease was very mild, and he thought this was another example of the process having been greatly limited by the irritation.

III.

OBSERVATIONS ON HIP DISEASE AS SEEN AMONG HOSPITAL OUT-PATIENTS.

AUGUSTUS THORNDIKE, M.D.

The following study was undertaken for the purpose of finding out what the treatment in vogue at the Children's Hospital in Boston has been accomplishing for hip disease. In a measure it was designed to show up shortcomings, and to pave the way for better care of patients.

In order to obtain end results, all cases of undoubted hip disease, which came to our clinic at the hospital ten years ago as new patients and remained long under treatment, were selected; but, as the number was small, those presenting themselves nine and eleven years ago have been added. No other selection has been made.

The conditions which prevail in the out-patient department of any hospital in a large city are by no means ideal: many practical difficulties exist which are to be mitigated, but cannot be entirely removed.

Children of the social class who are there under treatment in their homes with a mechanical appliance or splint, suffer from: (1) lack of care in properly applying the apparatus; (2) from broken splints, broken straps and buckles; (3) they come for inspection irregularly and often at long intervals; (4) many come from a distance, and seldom can afford the expense of the journey; (5) it is difficult to instruct some parents in the proper use of apparatus, either on account of ignorance and stupidity or because of their inability to understand English; (6) the slow course of the disease causes dissatisfaction, and leads to withdrawal from the clinic, and, occasionally, to a return after the effect of a year's or more disregard of the malady has left its indelible mark. It is not surprising, then, that the results are less good than in private practice: rather astonishing is it that all

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parents do not become disgusted because treatment is so prolonged.

In examining these cases, which number 55, we find them equally divided as to sex; that in 17 the disease was in the right hip, 36, left, and 2 on both sides; that the children were from six months to twelve years old when they first came for treatment, owing to the rule of the hospital, which treats children under twelve years of age.

Age.	*Number.*	*Per cent.*
Less than 1 year	2	3.7
1 to 2 years	2	3.7
2 to 3 "	5	9.2
3 to 4 "	9	16.6
4 to 5 "	10	18.5
		51.7
5 to 6 years	8	15.
6 to 7 "	6	11.
7 to 8 "	2	3.7
8 to 9 "	3	5.5
9 to 10 "	4	7.4
		42.6
10 to 11 years	2	3.7
11 to 12 "	1	1.8
Total	54	5.5

There were 2 children less than a year old; 2 between the ages of one and two years; 5, from two to three; 9, from three to four; 10, from four to five; 8, from five to six; 6, from six to seven; 2, from seven to eight; 3, from eight to nine; 4, from nine to ten; 2, from ten to eleven; 1, from eleven to twelve; and 1 whose age was not recorded.

From two to seven seems to be the favorite age to develop hip disease, and babies of a few months do not escape.

The time which elapsed between the detection of early symptoms by the parent and the first visit to the hospital was noted in all but 2 cases: less than a month in 4, one month in 6, two in 9, three in 3, four in 8, five months in 2, six in 7, seven in 1, nine in 1, ten in 2, one year or over in 5. Or, to state it a little differently, 10 said they had had it a month or less, 19, two months, or less; while only 5 out of the 53 came after a year had elapsed, and they had been under treatment in other places.

This is interesting, as it shows that the wide-spread effect of the teaching of orthopedics both in Boston and throughout New England has led to early recognition and early care of hip disease. Twenty-five years ago many would limp around for years untreated: some undoubtedly still do so, but their number is being reduced. Early treatment offers so much more chance of preventing deformity that it is important for both the profession and the laity to realize the necessity of bringing all lame children without delay under surveillance and treatment.

In trying to make an estimate of the duration of the malady in these cases, the number of available records becomes much smaller in consequence of going back ten years. Many leave the clinic, and fail to answer inquiries because they do not get well quickly; others, because they pass the age limit, and are transferred to other clinics still wearing their splints. I have estimated the duration from the time the parents noticed the first symptoms until the apparatus was successfully discarded (by successfully is meant without any ill effects for a year or more afterward).

Of the 17 cases, 1 successfully left off apparatus after eighteen months (a baby treated on the posterior wire or Cabot frame), 1 at four years, 1 at four and a half, 1 at five, 1 at five and a half, 2 at six and a half, 2 at seven, 1 at seven and a half, 2 at nine, 1 at nine and a half, 3 at ten, and 1 at ten and a half years.

If we except the baby, who did not walk until the splint was abandoned, the shortest duration was four years, and the longest still wears a convalescent splint after eleven years. 9 out of the 17 left the splint off after a period varying between six and a half and ten years. There has been trouble in abandoning the use of splints. After some relapses or exacerbations, attributed to discarding apparatus too early, the splints are now left off very gradually, at first for an hour a day, increasing one hour a week; and during the whole of this period, and for two months after, they are obliged to report weekly for observation, and, if any muscular spasm arises, they are told to wear the splint six months more, and to let us see how they are then.

Under this strict rule, splints are at times worn longer than they need be, in the hope of avoiding relapses.

The treatment employed has varied but slightly. Different forms of splints have been used, some cases have been treated without traction; but most of them used some modification of the Taylor long-traction splint.

Prolonged recumbency never was employed in these cases, but recumbency on the Bradford frame with weight and pulley traction was used for 35 out of the 55 (63⅔ per cent.) for periods varying from a week to eight. It was done either in the ward or at home under the supervision of the trained nurse sent from the hospital; 11 children underwent periods of recumbency twice, and 4 three times, for correction of faulty position of the hip or for the relief of the acute sensitive hip. For apparatus the Taylor long-traction splint, with a few simple modifications, was used on 49 of the 55 cases, and a long convalescent splint followed on most of them. The plaster of Paris spica was used on only 3 of these cases: all 3 happened to do badly. It is much more frequently employed to-day. One of these was given a long-traction splint, and is still wearing his convalescent splint. Of the others, 1 left the clinic a year later, and is still acutely sensitive: the other was reported by letter to be very lame.

The Cabot frame was used for little babies three times with good results. 1 of the double hip cases had a double long-traction splint, which was changed to a double Thomas hip splint with benefit. The other case still wears the double Taylor splint.

The proportion of cases which had abscesses was two-fifths (42 per cent.), or 23 children. 2 nature reabsorbed. The other 21 (38 per cent.) were incised, curetted, and drained in the Children's Hospital, excepting 1 at the West End Infants' Hospital. The proportion of tubercular sinuses following operation for drainage was large, and they persisted many months. Necrosis of the acetabulum was detected twice by operation in these 21 cases of abscess: there were also 2 cases of excision of the hip, in both of which the pelvis was found diseased. Many of those with abscess had previously been in the ward for traction in bed to correct faulty position or to allay the sensitive hip, but 4 of the abscess cases had not.

The proportion of cases with abscess indicates that this group of hip cases belong to the severer type of hip disease.

The amount of permanent deformity and real shortening was investigated.

SHORTENING AND RESULT.

Shortening.	*Number.*	*Per cent.*
0	7	20.
¼ inch	1	2.8
½ "	6	17.
¾ "	3	8.6
1 "	4	11.4
1¼ inches	1	2.8
1½ "	4	11.4
1¾ "	2	5.7
2 "	1	2.8
2½ "	1	2.8
3 "	2	5.6
4 "	3	8.4
4¼ "	1	2.8
	35	

Average, 1⅓ inches.
60 per cent. had 1 inch or less.
83 per cent. had 2 inches or less.

Out of 36 cases 7 had no shortening; 1, ¼ inch; 6, ½ inch 3, ¾ inch; 4, 1½ inches; 2, 1¾ inches; 1, 2 inches; 1, 2½ inches; 2, 3 inches; 3, 4 inches; and 1, 4¼ inches,—average, 1⅓ inches.

All of the cases with 3 or more inches of shortening showed something unusual to have produced it. 1 with 3 inches of shortening had the trochanter 2 inches above Nélaton's line, and ankylosis after ten years of hip disease.

Another had undergone subtrochanteric osteotomy; in 2, necrosed bone had been removed from the acetabulum; and 1 had undergone excision of the hip.

Permanent flexion of the hip was studied in 43 cases: a few degrees of permanent flexion were found in 5 cases; 10° in 7, 20° in 7, 30° in 3, 45° in 3, and more than 45° in 2 cases. 16 cases showed no permanent flexion present.

As much as 20° of permanent flexion may exist without impairment of the gait: 20° or less was found in 35 out of 43, or about 81 per cent. Better results would have been obtained, had more attention been given by the parents to traction and proper care of apparatus. It is certainly true that permanent deformity can be prevented by careful and persistent mechanico-therapeutic treatment at least nine times out of ten.

Of the bad results 1 was ankylosed with 30° of permanent adduction, and 2 had a persistent adduction of 10° without bony ankylosis.

The final results as to joint motion in flexion was for 45 cases:—

Motionless	14
Less than 20°	9
20 to 45	8
45 to 90	4
90 and over	10
Total	45

In other words, 22 had more than 20° of motion, and 23 less: about one-quarter had motion to the right angle or beyond. Motion in abduction:—

Abduction was impossible in	14
possible up to 15° in	3
good in	5
almost normal in	8
Total number	30

In estimating these final results, several cases who did not respond to letters were included, taking the measurements from the record book, if they had been coming at least six years when the last measurements were made. The figures show that, even with poor home care, in an out-patient clinic considerable movement and control of the joint may frequently result. Certainly more than half enjoy a free walking gait; but it is to be remembered that the selection of these cases was made at a distance of ten years, and they represent only those who remained the longest under treatment. They, therefore, by selection belong to the graver cases of hip disease.

On attempting to compare these results with those published by Gibney, Waterman, and Reynolds five years ago, from the clinic of the Hospital for Ruptured and Crippled in New York, one notices that their figures were obtained from patients five years or more after they had been discharged from the hospital presumedly well. About a tenth had returned, and were again under treatment. These statistics included also the severer types of hip disease. We find that in Gibney's cases 66 per cent. showed 1 inch or less of actual shortening, and 86 per cent. 2 inches or less: in the Children's Hospital, Boston, we find 60 per cent. with 1 inch or less, and 83 per cent. with 2 inches or less. So that the figures correspond in a rough way, and are slightly to the disadvantage of the Boston clinic.

As regards motion, the balance is the other way: 22 per cent. of the Boston cases could flex to a right angle, 9 per cent. to a point between 45° and the right angle, 17 per cent. to a point between 20° and 45°, 20 per cent. from a few degrees to 20°, and 31 per cent. were fixed and without motion. The fact that about one-eighth of these cases were still under treatment makes it undesirable to institute the comparison, for it is the rule that the amount of motion present when apparatus is discarded decreases for a few years.

In Kõnig's recent work on Bones and Joints, 568 cases of hip disease from the Royal Berlin Hospital clinic were analyzed. Abscess occurred in two-thirds, or 66 per cent. There were 381 resections of the joint. If these excisions be omitted, the proportion of cases having abscesses becomes one-sixth instead of two-thirds, showing that resection is more frequently done in Berlin for suppuration than here. Kõnig evidently favors excision where American orthopedists would treat conservatively, and he undoubtedly saves time. "Resections," he says, "were formerly too frequent; but now we are too apt to neglect the operation in favor of conservative treatment." We believe that with earlier and more careful orthopedic treatment the number of cases requiring resection may be greatly lessened. One reason for the greater amount of suppuration in Berlin may arise from failure to recognize hip disease early, or to enforce efficient traction or fixation early in the course of the disease.

Such have been the end results in these cases, who after a long period of splint treatment, varying from four to ten years, have been walking without apparatus for a year or more without any return of acute symptoms. A fair proportion would not be noticed to limp: others are less fortunate. None are deprived of walking, and almost all walk well if their real and apparent shortening be compensated for with a high heel or sole. Future improvement in the end results is expected from greater and constant attention to all the little details of treatment, from more nourishing food, plenty of out-of-door air and sunshine, and from careful skiagraphic study of lesions which often yields new indications for treatment, if only we can learn to correctly interpret them.

IV.

HIP DISEASE, CONSIDERED WITH SPECIAL REFERENCE TO DIAGNOSIS AND THE COMBINED TREATMENT.

Second Paper.

R. TUNSTALL TAYLOR, M.D.

In the paper which I presented last year to this Association, under the title of "The Combined Treatment of Coxalgia," meaning thereby both the mechanical and operative treatment, I advocated the anterior incision, erasion, disinfection by 2½ per cent. formalin solution, of the tuberculous focus and suture in that middle class of cases in which the X-ray and clinical symptoms showed conclusively that the mechanical means alone did not tend to arrest the extension of the process and prevent destruction of the articulation. I followed up the operative treatment with the bed and ambulatory mechanical treatment ordinarily employed. I used pure carbolic acid and alcohol after erasion in a number of cases, but lost 1 from carbolic acid poisioning, so that now I use formalin as the safer antiseptic.

I did not advocate the operative treatment in the earliest stages of extra-articular tuberculous foci at the coxo-femoral articulation, for the reason that the mechanical treatment will often cure such cases; nor did I recommend operative interference on tuberculous foci, where discharging sinuses (invariably secondarily infected) were present, for obvious aseptic reasons.

However, in the 9 operative cases presented I reported 3 with sinuses discharging, on which all other means had failed to relieve the acute symptoms of pain, night cries, etc., 3 in which there was very extensive bone destruction, and in which from the low state of the patient's health one would readily infer abscesses with sinuses would form, and 3 in which the disease

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was advancing, as shown by the X-ray; but one could only surmise that extensive caseation and suppuration would occur if unchecked.

I dwelt at some length on the skiagraphic diagnosis, which is so readily and promptly obtained in coxalgia in children within an hour or two, how perfectly evident the nature of the lesion is, the characteristic clouding and softening seen even in very early stages, locating exactly the portion of the joint involved, and not giving rise to the questions which must needs arise with tuberculin, when used for diagnostic purposes. We now find it necessary to employ the latter only in exceptionally difficult cases. With a family history of tuberculosis, an insidious onset, muscular spasm, limitation of motion, even if only present at the limits of motion, night cries, atrophy, a slight elevation of temperature, malposition of the limb in attitude and gait, and the X-ray negative, tuberculin becomes superfluous, except in very rare instances, and this applies not only to the hip, but to the other joints and spine, so that we may now place tuberculin among the "Ancient and Honorables," to be used only in difficult cases in conjunction with the X-ray.

The simplicity of the tuberculin test appeals to one at first, if we may disregard the discomfort of the patient and the "increased local reaction" (which last, however, is as often absent and no guide). To an observer, who has pretty well made up his mind that a case is or is not tuberculous, the local reaction in joint disease readily lends itself to his point of view, just as any one similarly impressed would get a range of motion of so many degrees, while another observer would find a dissimilar range holding opposite views.

According to C. M. Wood's analysis of 100 cases in which tuberculin was used at the Cook County Hospital for Consumptives (*Journal American Medical Association*, April 19, 1902), he found that with doses as large as ten to fifteen milligrams that a positive reaction *must* consist of a rise of temperature of 2° within six to thirty-six hours, together with at least two of the following symptoms: nausea, chilliness, headache, and muscular pains. How rarely we find two of these symptoms associated in tuberculous children with the fever reaction, and simply find the lassitude and anorexia incident to the fever!

The syphilitic, leprous, and neurotic have been reported time and again as responding to the tuberculin injection, giving a positive reaction; and Wood states, to use his words, that "in something less than 50 per cent. of cases syphilis gives a reaction which can hardly be distinguished from that of tuberculosis. Consequently, in any case showing a reaction, active syphilis should be excluded before it is decided that the case is tuberculous." Syphilis and tuberculosis are among the most common causes of joint disease. May we not be delaying a long time in making our diagnosis, while anti-syphilitic therapy is being employed for exclusion, before pronouncing the case tuberculous?

Actinomycosis is said to react also. In an infant in my wards a few years ago, with swelling below the trochanters, slight fever, lessened function, pain causing insommia, but without muscle spasm and with joint motion, a prominent consultant, after repeated increasing doses of tuberculin and no action, was inclined to blame the tuberculin (Trudeau's) for a non-tuberculous diagnosis; for he considered it at first a "low form of bone tuberculosis," but later suggested "sarcoma." So that with negative reaction we are often perplexed. The X-ray showed periosteal thickening, the joint intact; and mercury cured the case.

From my experience with the two methods running over a period of some years, I should be led to advise and value the X-ray *first* in the diagnosis of bone and joint tuberculosis, if good negatives are obtainable, and recommend tuberculin *only* when either good negatives cannot be obtained or cannot be interpreted or are inconclusive, with the skiagraph and symptoms.

Our custom has been to use from 3 to 5 milligrams of tuberculin obtained from Koch's or Trudeau's laboratories, made up freshly with ʒ*j* of distilled sterile water, *mv̄* of a 5 per cent. carbolic solution, and *mj* of tuberculin. 1 minim of this solution is equivalent to 1 milligram of tuberculin. For less than 5 milligrams we use a more dilute solution for accuracy.

The more detail one obtains in the skiagraphs, either in development or by intensification of the negatives, and the more experience one has in the interpretation of X-rays, the plainer the pathological lesion becomes.

In order to form some idea of the value of the combined treatment, if one can do so from the 9 cases reported, I will now compare their present condition with that which obtained before the operation, and for convenience will divide them into three groups, as indicated above.

I. In the group in which the disease was shown by the X-ray and symptoms to be advancing, but in which one could only surmise that extensive caseation and suppuration would occur if unchecked, we have cases 2, 3, and 5.

Case 2.—M. D. Died on the operating table as a result of carbolic acid poisoning, and hence gives us no information in the treatment of these cases except the danger of the use of pure carbolic acid in the joints.

Case 3.—L. R. Girl, age seven years. First seen November 28, 1901. Duration of disease before operation, three and one-half years. Right hip. Duration of treatment elsewhere, one year (plaster spica and bed traction). Hospital for Crippled and Deformed Children, one year, bed traction and brace. General health good. Joint function before operation, no motion. Position of limb: flexed 15°, adducted 6°. Thigh atrophy, ½ inch. Shortening: real, ⅛ inch; apparent, ¾ inch. X-ray showed caseated areas in upper surface of head and neck. Operation, February 19, 1902. Foci of granular débris in upper surface of head and neck removed by curettes. Pure carbolic poured in cavity. *Status præsens:* General health excellent. Joint function: flexion, 80°; abduction, 5°; adduction, 10°. Rotation: out, 45°; in, 0°. Brace removed December 15, 1902. Position of limb, adducted 6°. Thigh atrophy, 1 inch. Shortening: real, ¼ inch; apparent, 1 inch. Walks with slight limp, and can sit comfortably erect.

Case 5.—R. W. L. Boy, age four. April 24, 1899. Duration of disease before operation, three and one-half years. Left hip. General health: pale, wan, listless, only fairly nourished and color poor; anorexia and constipation. Joint function before operation: flexion, 30°; abduction, 10°; adduction, 5°. Rotation out, 90°; rotation in, 5°. Position of limb, adducted 6°. Thigh atrophy, 1½ inches. Shortening, apparent, ½ inch. X-ray showed thickened joint, disintegration of femoral head. Operation, March 27, 1902. Gritty bone detritus removed, including a large piece of the femoral head and upper part of neck. One ounce of pus evacuated from capsule. Pure carbolic acid and alcohol used. Brace removed January 15, 1903, and allowed to walk. *Status præsens:* General health excellent. Joint function: flexion, 5°; abduction, 10°; adduction 10°. Rotation out, 0°; in, 5°. Position normal. Thigh atrophy, ½ inch. Shortening: real, none; apparent, none. He walks quite well, but cannot flex thigh in sitting.

In these two cases I feel the result is better than it would have been if mechanical treatment alone had been used. Sinuses would probably have formed, and the duration of the disease has been unquestionably shortened; for the patients have no mechanical treatment now, and only massage is employed.

Even granting the small range of motion in Case 5, the absence of shortening and the excellent position of the limb promise greater usefulness than would have been obtained, considering the pathological destruction present, had the operation not been done and traction not been made in *abduction*. The progress of the disease was undoubtedly stopped, and healing obtained at once.

II. The next three cases form a group in which, from the low state of the patients' health and the very extensive and increasing destruction, one would most certainly expect abscesses to form, with sinuses to further sap their already depleted systems.

CASE 4.—I. W. Girl, age four. First seen July 28, 1901. Duration of disease before operation, thirteen months. Child had no vitality; was very frail, anæmic, and thin. Joint function, no motion in right hip. Position of limb, flexed 30° and adducted 10°. Atrophy of thigh, ½ inch. Shortening: real, none; apparent, ½ inch. X-ray showed involvement of whole head and neck down to intertrochanteric line. Operation, May 7, 1902. At the operation nothing but gritty remains of the right femoral head was found, and the cartilaginous portion of the head was loose within the capsule, as a shred, perhaps 1½ inches long and ½ inch wide. At least two tablespoonfuls of tuberculous bone was removed, and formalin was used.

In my paper of last year I stated that "the present indications are that the child will not have a stiff joint; but how much motion she will ultimately have, or whether there will be a relapse, it is impossible to say: how stable her joint will be is also problematical."

Status præsens: Child looks exceedingly well, has a good color. and is fairly nourished. Joint function: flexion, 85°; abduction, 45°; adduction, 30°. Rotation: out, 90°; in, 20°. Position of limb normal. Joint stable. Atrophy of thigh, ⅝ inch. Shortening, real, ½ inch. Lengthening, apparent, ½ inch. Brace removed April 25, 1903. Walks as one would from the lack of use of a limb, and can sit erect. An altogether unexpected and gratifying result.

Case 1.—M. E. W. Girl, aged eight years. First seen October 10, 1901. Duration of disease before operation, six months. Right hip. Child was thin, delicate, and ill-looking. Night cries and pain distressing. Joint function, nil. Position of limb: flexed 50°, adducted 10°. Atrophy, ½ inch. Real shortening, none. Skiagraph showed general clouding of the joint and erosion of upper surface of femoral head and neck. Epiphyses of trochanters cannot be seen. Operation, February 26, 1902. Perhaps half an ounce of dead bone removed from upper and anterior surface of the femoral head and neck, as is well shown in skiagraph taken after operation. *Status præsens.* General condition very good, and she is better nourished. Joint function: flexion, 60°; adduction, 10°; abduction, 10°. Rotation: out, 60°; in, 0°. Position of limb, 4° adducted. Atrophy, thigh, 2 inches. Shortening: real, 1 inch; apparent, 1½ inches. Brace removed April 15, 1903. Leg is very weak. Cannot walk well yet, but can sit erect comfortably, and outlook is excellent. This case has turned out also better than could be hoped for ordinarily.

Case 7.—F. H. Boy, age five years. First seen January 31, 1900. Duration of disease before operation, four years. Left hip. Thin and tuberculous-looking lad. Joint function: flexion, 30°; abduction, 10°; adduction, 0°. Rotation: in, 5°. Position of limb, fixed at 90° outward rotation. Atrophy of thigh, 1 inch. Shortening: real, ½ inch: apparent, none. Skiagraph showed destruction of a great deal of tissue in head, neck, and acetabulum. November, 1900, operation through posterior incision (not advised ordinarily) chosen on account of large abscess forming. Joint curetted as thoroughly as possible through this incision, 1:200 bichloride irrigation used, and wound left open. Healed by granulation. Traction stopped June, 1902. *Status præsens:* General health excellent. Joint function: flexion, 5°; abduction, 5°. Position of limb, 4° adducted. Atrophy, thigh, 2½ inches. Shortening: real, ½ inch; apparent, 1 inch. Only walks fairly well, and sits awkwardly. This case having been operated on through the posterior incision, when a sinus and abscess were forming rapidly and allowed to granulate up, is scarcely a fair type of what can be accomplished early by the method advocated (viz., the anterior incision).

III. The third is the septic group in which sinuses had formed, and the patients were laboring with a mixed infection at the time when the operation was done, as all other means did not relieve the acute symptoms.

Case 6.—T. C. Boy, aged eight years. First seen August 21, 1900. Duration of disease before operation, four years. Boy thin, anæmic, and general condition poor. Periodic attacks of pain and hectic fever. Joint flexed in adduction 6°. Two profusely discharging sinuses. X-ray shows extensive disease of head, neck, and acetabulum. Joint practically obliterated. Bones atrophied. Thorough curetting of head, neck, acetabulum, capsule, and sinuses. Pure carbolic and alcohol used. March 1, 1903, traction splint and bed night traction discontinued. Crutches alone used. *Status præsens:* General condition and health excellent. One sinus closed: the other discharges about ʒ*j* of pus a day, but this is lessening. No pain nor acute symptoms. Shortening: real, ½ inch; apparent, ¼ inch.

Case 8.—J. S. Boy, aged five years. First seen February 20, 1901. Duration of disease before operation, 20 months. Left hip. Condition very poor, thigh riddled with sinuses. X-ray showed worm-eaten head, neck, and acetabulum. No motion. Position of flexion, 60°. Position of adduction, 5°. Thigh atrophy, ¾ inch. Shortening: real, ¼ inch; apparent, ¾ inch. Erasion done December 27, 1901, by external incision, to avoid sinuses, which were widely opened, irrigated with 1:2000 bichloride, healed by granulation. Traction discontinued May 1, 1903. General condition good. Apparent lengthening, ½ inch; actual lengthening, ½ inch. Position of flexion, 5°; position of abduction, 15°. No motion in flexion, abduction, or adduction. Sinus discharges about ʒ*jss* per week.

Case 9.—W. E. Boy, aged four years. First seen July 12, 1899. Right hip. Duration of disease before operation, four years. Condition similar to Case 8. No motion; malposition, in flexed position, 60°. X-ray showed separation of a portion of the acetabulum and a punched out erosion of the femoral head and its separation. Erasion, February 5, 1902; external incision; healed by granulation of wound; bicholoride disinfection. *Status præsens:* General condition good. Shortening: real, ½ inch; apparent, none. Position of flexion, 5°. Motion: flexion, 20°; abduction, 5°; adduction, 5°. Rotation: out, 90°; in, 30°. Slight discharge from sinus. Traction discontinued May 1, 1903.

The last three cases simply go to prove the importance of checking the extension of the tuberculous process before joint disintegration occurs. The X-ray is a valuable guide, if skiagraphs are made from time to time, which is our evident duty in all cases of hip diseases, to note any extension of the process; and the combined treatment is imperatively indicated from my experience to cut short the disease, and manifestly demanded if the mechanical treatment alone will not arrest it.

I will not trespass further on the time and patience of the Association by reporting similar cases operated on during the past year; but I will state that my research in this direction has repaid me according to my judgment, and I have used, and will use, the combined treatment on every case in which the skiagraph shows extending caseation, until I have conclusive proof of my error. Of the two contra-indications suggested, suppuration and metastasis of the tubercle, I have experienced no examples. In regard to the third contra-indication,—viz., shortening of the limb in the typical cases at the time when the operation was indicated,—the maximum real shortening is 1 inch (1 case) of the 5 suitable cases, if we include very extensive joint destruction in the suitable cases. Of the other 7 cases, 2 had ¼ inch real shortening, 4 had ½ inch real shortening, and 1 had no shortening, more than a year after the operation.

3 of the 5 cases, in which good joint function might possibly be hoped for, have excellent free motion (Cases 1, 3, 4). In Cases 5 and 7 we have practically ankylosis in a normal useful position, but these 2 cases had run three and one-half and four years before the operation respectively. I do not doubt that Case 4 would have surely had sinuses; and, if amyloid disease did not cause her death, ankylosis would have been the result. As it is, partial regeneration seems to have taken place.

The erasion and disinfection has undoubtedly benefited the septic cases also, not only in general health, but in the condition of the joint. I feel no one will question that the course of the disease is shortened by the operation.

Is this procedure to be recommended as a routine method of treatment?

My experience, although covering but a few cases, perhaps some 20 in all, would lead me to think most favorably of it, and, as I have said, lead me to adopt it, until I have conclusive proof of my error; and I therefore recommend it, and trust that others may report their experiences with it.

In regard to the after-treatment:—

Our cases are kept in bed some eight to twelve weeks after the operation with traction in abduction. They are then gotten up with the long-traction splint bent also in abduction. This they wear for six months; and, if all goes well, then they discard the high shoe, crutches, and walk on the convalescent splint attached to shoe without traction. At the end of the year they are allowed to go without apparatus, and have massage, passive and then active gymnastics, to increase the power of abducting the limb.

To return to the question of diagnosis for a moment. Vulpius claims that many so-called prompt cures of coxalgia are in reality cases of mild osteomyelitis, due to pyogenic bacteria and not the bacillus tuberculosis. To refute this, should we not only make the cultures in the ordinary way at the time of the operation or exploratory incision, and not only do this, but inoculate guinea pigs with the open joint scrapings?

Lorenz has criticised our prolonged use of traction as detrimental.

Is he right about this (although we all recognize his aims at ankylosis, as the desideratum in tubercular hip disease, fall *far short* of ours for motion)? I am inclined to think he is, if I can judge by my own experience and observation. Have we not all seen bad cases of genu recurvatum and an unstable limb as the result of too prolonged traction treatment for coxalgia, especially with that type of traction splint without posterior calf and lower thigh bands?

After the acute stage of the disease is passed, could we not sooner discard the traction splint for some partial fixation or convalescent apparatus to allow moderate functional use?

We have all seen, in skiagraphs especially of paralytic and congenitally dislocated shoulders, how the humeral epiphysis and diaphysis on the unused side is infinitely smaller and less developed than its mate. Is not the lack of functional use and lessened circulation more largely to blame for this than the tropic centres or the disease? If the epiphysis is underdeveloped, so must the limb be proportionately shortened. We have all noticed neglected contracted legs from infantile paralysis, and what extreme shortening there is in those cases in which the leg has not been straightened and braced to allow functional use at an early date, and how much less the shortening is when the legs can be used early. Does not this teach us to allow functional use in coxalgia as early as is safe, and not keep up the traction too long?

Finally, will the X-ray not help us to determine the proper time to allow functional use of a tuberculous joint tentatively?

One of the most striking features which one sees in the X-ray negative in the earliest or late stages of active tuberculous arthritis or epiphysitis is the clouding, which is present for some distance around the foci, while all the details on the normal side are sharply defined. The trochanteric epiphyses cannot be seen in the negative on the diseased side; and the worm-eaten appearance in the joint, if the process has gone that far, is seen through a haze.

After operation, or as healing takes place, the outlines of the various parts become more and more sharply defined, until there is practically no difference in the detail observable on the two sides.

Thus the X-ray from the beginning until the end of this disease is one of our most valuable guides.

V.

SOME POINTS IN THE TREATMENT OF HIP-JOINT DISEASE.

GEORGE B. PACKARD, M.D., OF DENVER.

I wish only to discuss very briefly in this paper two or three points in the treatment of coxitis.

In the various volumes of our Transactions the subject of the treatment of hip-joint disease has been very thoroughly discussed. Not only the relative merits of excision, fixation, and traction have been thoroughly gone into, but the value of the various splints and their modifications in producing the desired ends. I believe that it makes very little difference whether we use a Thomas splint, a long-traction splint with a good fitting hip band, or other modifications, provided the appliance is accurately adjusted and the patient properly observed.

In nearly all cases the disease yields to any of these methods of treatment (so far as acute symptoms are concerned), especially if they are instituted early, although the ultimate result may be attended with a varying amount of deformity. But, whichever method we use, we expect in a short time that the spasm will diminish, the pain, if present, cease, and the power improve.

One of the questions that confronts the writer after the relief of the acute or apparently active symptoms is, How long should this treatment be continued without allowing some functional use of the affected member?

Dr. Henry Ling Taylor, in a paper read before this Association on "The Retardation of Growth as a Cause of Shortening after Coxitis," arrives at the following conclusion:—

The amount of retardation of growth appears to bear a distinct relation to the amount and duration of the restraint or disability.

My attention was very forcibly called to the relation that the

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lack of functional use bears to retardation of growth and disability following coxitis by the following case:—

A girl of fourteen years was admitted to St. Luke's Hospital, Denver, and came under my care. She had recovered from double hip-joint disease, with marked adduction of both legs and flexion of the right. The legs were crossed with bony ankylosis at the left hip, but with some motion remaining in the right. There was no displacement of the head of the bone from the acetabulum on either side, neither did suppuration occur in either joint. There was marked muscular atrophy above and below the knee of the right, and 2 inches of actual shortening as compared with the left. I performed subtrochanteric osteotomy on the left femur and tenotomy of the adductors of the right side, and brought both legs into good positions. I found later that the right leg was not only shorter and the muscles atrophied, but the power very much reduced. On account of the flexion of the right femur she was unable to make much use of the right leg in locomotion. While bending forward, she could reach the floor with the toes, but it remained pendent most of the time. She bore her weight upon the left leg with the assistance of a crutch as soon as the pain, tenderness, and disability were relieved, which was about one year. The mechanical treatment was of short duration, inefficient, and only applied to the right leg. She had been walking with a crutch for about five years.

It will be observed that the right leg which she brought into constant use, on account of position, directly after the subsidence of the acute symptoms, is a strong, well-developed member, with bony ankylosis, while the left, which has been practically at rest from its flexed position and deprived of functional use, is atrophied, short, and weak, although considerable motion is preserved.

We have here two tuberculous joints where many of the elements we have to consider in these cases are identical. The early symptoms, environment, and general condition are the same. The only difference in the management of the joints was that one was brought into use comparatively early, while the other remained more nearly at rest for a long period.

This case seems to illustrate the importance of a certain amount of functional use as early as practicable, and perhaps to corroborate the correctness of a principle laid down by Professor Lorenz in the treatment of tuberculous disease of joints in children. He advocates weight-bearing after the subsidence of pain and tenderness, but continues to immobilize the joint for a long time, and aims to procure bony ankylosis in a good position. I have never allowed complete weight-bearing as early as he suggests, but have used a protective brace that removes the greater portion of joint pressure, but permits use of muscles and some motion, if it does not increase the spasm.

It may be said, in criticism of the position taken in this paper by the writer, that a recurrence of active symptoms is likely to occur if complete fixation and protection is discontinued soon after the subsidence of active symptoms. It is true a relapse will take place in a certain number of cases, but a relapse will also take place many times when immobilization and protection have been kept up for several years. And, when we come to consider the likelihood of retarded growth and the weakness that is likely to follow a long-continued lack of function, would it not be more rational to substitute massage of the muscles and a protected use of the joint after the subsidence of the active symptoms?—the latter usually extending from a few months to a year, and in some cases longer. In fact, my first instructions on the management of the treatment of coxitis by the late Dr. Charles Fayette Taylor were in accordance with these principles. If I remember correctly, his plan was to use a long-traction splint for several months, or until the acute symptoms were relieved, particularly until the spasm of the joint was diminished, and then to substitute a brace with motion at the knee that protected the hip joint, but allowed a certain amount of functional use. If he found that the spasm increased from this change, he returned for a while to the original treatment.

While I gradually abandoned this plan of treatment for prolonged fixation and disuse, I have during the last few years returned to it with some modification, and feel that in the end it gives the best functional results.

Another point that I wish briefly to consider is the importance of the hygienic and constitutional treatment. I believe these measures exert a powerful influence in the control of this disease. I fully agree with the sentiments expressed by our fellow-member, Dr. Galloway, in his paper on this subject at the last meeting of this Association. The general treatment has undoubtedly been neglected in our enthusiasm over the methods for local treatment.

We should also remember the liability of these cases to develop pulmonary tuberculosis at any time. This would be a serious complication, and it is an important reason for placing these cases under the most favorable conditions possible. The more favorable the surroundings, the less likely are active symptoms or suppuration to develop. We all know the influence of sunshine, fresh air, and increased nutrition on pulmonary tuberculosis. The effect on joint tuberculosis is equally beneficial.

Relapses take place many times, or dissemination of tubercle with development of tuberculosis in other organs, without regard to the time the joint has been immobilized. Therefore, it becomes a serious question if we have done our duty in trying to overcome this inherited tendency or weakness which favors the development of the specific organism. Many suffer from non-hygienic surroundings. We should urge that as much time as possible be spent in the open air and sunshine, and when indoors the time should be spent in well-ventilated rooms, and at night sleep with open windows, regardless of the temperature. The diet is also an important factor in the treatment of these cases. Children particularly are very careless about taking the proper amount of food, and, unless this matter is looked after very carefully, they will not take the proper amount of nutrition. While no absolute rule can be given for diet on account of the idiosyncrasies and complications, yet in a general way it may be said that meat, fats, raw eggs, and milk should be taken freely. I think an excellent plan in these cases as well as in other forms of tuberculosis is to take three substantial meals a day, each meal to be followed in a short time by a glass of milk and a raw egg, the latter not taking the place of the regular meal, but simply supplementing it. Gastric disturbance will not occur as often from this method of increased feeding as it will when the extra food is taken midway between meals.

When anæmia is present in addition, we must be persistent with the use of hæmoglobin or iron and arsenic. I feel confident that, if the general rules observed in the treatment of pulmonary tuberculosis as regards hygiene, diet, and general management were applied to joint tuberculosis, we should be able in a measure to overcome the inherited or acquired weakness that favors the development of the specific organism and its subsequent effect upon the joint. If we work along these lines a little more, I believe it will not be found necessary or advisable to continue so long our restrictive measure to the joint, but will permit of earlier functional use, and thereby prevent a good deal of the retarded growth and weakness that are so frequently observed.

These remarks are not intended as the slightest reflection on the great importance of local treatment in coxitis, but are simply suggested as adjuncts in obtaining the desired ends. These suggestions apply equally to other tuberculous joints, but I used the hip joint as an illustration as being perhaps a joint where the disease is more serious and where treatment is continued longer, and where we are more likely to get retarded growth and weakness. Perhaps my cases are observed under more favorable conditions than the average on account of the favorable climatic condition of the Rocky Mountain region, and consequently there might be less danger in withdrawing active local treatment comparatively early. Yet I think the suggestions are well worth considering under any conditions.

DISCUSSION.

Dr. **Bernard Bartow**, of Buffalo, said that he had been interested in the presentation of Dr. Packard's views from the point of view of the climatic influence on tuberculous disease. His own experience was that, with the best climatic conditions for constitutional improvement, movement of the joint was of no advantage, and that fixation, with protection as perfect as possible, was essential until arrest of the disease was assured. All recognized the value of climate and hygienic conditions in modifying the local disturbance, but any relaxation of local treatment seemed a faulty plan. He had also been interested in what had been said by Dr. Taylor as to the combined treatment, and considered the method advocated by him was ideal for almost any period of the disease. The cases reported showed its advantage, especially in the early stage. The disease was one which could not be trifled with, and the more quickly the tuberculous focus is removed, the better the chance of arresting the process and diminishing the effects of the disease.

Sir **William Hingston**, of Montreal, was invited to take part in this discussion. He said he had been here long enough to learn, and with pleasure, that earlier surgical interference was resorted to than formerly. The question presenting itself as to when and how to interfere was one of great difficulty. He had long ago come to the conclusion that to keep a child for an indefinite period with an extending apparatus was a mistake. When should one give up all hope of surgical interference other than operative was a difficult question. The judgment of the surgeon must come in to determine how long to wait. If we erred at all, it should be rather upon the side of earlier operative interference; for, when pus is present in considerable quantities, and the tissues are beginning to disintegrate, it is useless to wait. He thought the late Dr. Sayre had placed the profession under the deepest obligation by advocating earlier surgical interference than was usually practised previous to his time. In a great number of traumatic cases—and most of them he thought were traumatic—one could obtain a desirable result by other means without resorting to the knife; but, in those cases where operative interference seemed to be indicated, that interference should not be needlessly delayed. He would like to ask, What are the advantages of the anterior incision over the one advocated and practised generally? His own practice had been to make use of the horseshoe incision, as it seemed to lend itself better to drainage. By practising the most careful aseptic surgery, however, there should be no additional risk from the anterior incision; but he would be glad to learn what are the ages presented by the anterior incision.

Dr. G. G. **Davis**, of Philadelphia, said that in cases of acute tuberculous inflammation he had not infrequently trephined the head of the bone, making six or eight small perforations. By this means one was able to cut short the acute symptoms, the disease apparently subsiding. In several instances in which he had done this and discharged the patient, the symptoms had reappeared: in other words, while operative procedures would modify the symptoms, they would not cure the disease. If Dr. Taylor would deliberately excise all of the disease, that was a different matter, but operative procedures did not in themselves cure the affection, and did not relieve one of the necessity of practically relying upon rest as a curative measure.

Dr. V. P. **Gibney**, of New York, said that Dr. Thorndike's paper was an excellent and valuable one, but, being purely statistical, hardly admitted of discussion at this time. With regard to Dr. Taylor's paper he would say that he believed that by the aid of the X-ray, or even without it, one could recognize a suspicious mass under the trochanter, or the femoral vessels, or in the gluteal region, and could feel sure that there were present the products of disintegration. He believed it to be a good plan to incise these cases, cutting down upon the points of infiltration, squeezing out the contents, and treating the case exactly as one would an abscess which was aspirated. He would advise against the use of chemicals, and recommend sewing up the wound without drainage, and then applying a skin-fitting plaster of Paris bandage and an ice-bag, and keeping the child at rest for some days. He had found a number of cases in which the night cries had been terrific, and nothing had been accomplished by traction or fixation, in which relief had followed almost magically the treatment just outlined. His objection to using chemical disinfectants or doing a more extensive operation was that one was apt to get beyond the area of the diseased tissue which one was trying to eliminate. Having carried out the treatment described, an X-ray photograph should be taken to determine whether or not any disease remained. If the indications of disease returned, the operation should be repeated, thus doing away as rapidly as possible with the products of the disease. The X-ray should be the guide as to the amount of traction and the length of time it should be kept up.

Dr. **Newton M. Shaffer** said that Dr. Taylor had brought out a very interesting question, raised by Lorenz especially, concerning the removal of the apparatus in a stage which, the speaker said, he personally felt was too early. It seemed to him there was one simple test which would tell readily when the patient was in a condition to have the apparatus removed. The initial limp was the danger signal, and all the way through the inability of the patient to bear the weight of the body upon the joint was clearly marked. When one reached the point where the patient had recovered from the disease, if the patient then showed a disposition to bear his weight upon the limb, one must discriminate between the disability due to disease and the disability induced by the prolonged use of apparatus. Weight-bearing was the test of whether or not it was safe to leave off the apparatus. He had seen many cases in which the patient had recovered without knowing it, and had come back after several years of indifferent treatment, and, on the removal of the apparatus, had walked with a gait simply due to the prolonged use of apparatus. This test in itself constituted an almost certain indication of the time when the apparatus could be safely removed. He was convinced that the disability of the disease was a distinct and important factor, and that the disability due to the use of the apparatus could be readily recovered from, so that he did not fear the atrophy and disability produced by the prolonged use of apparatus. He would rather a patient would use an instrument a year too long than take it off a few months too soon. He was of the opinion that ordinarily the apparatus was not kept on long enough.

Dr. **Clarence L. Starr**, of Toronto, said he would like to know more about the case dying on the table of carbolic acid poisoning. Two or three years ago he had presented to the Association the idea of early curetting for tuberculous disease, and the swabbing out of the sinuses with pure carbolic acid. At that time it was suggested that it was advisable to wipe out the cavity with alcohol. This seemed to him a great mistake, and he believed the case of carbolic acid poisoning was due to this one feature. He had swabbed out such cavities many times for several years. The use of carbolic acid formed a wall against absorption, but by the use of the alcohol this protecting wall was dissolved away and absorption of carbolic acid favored. He was glad to see that there was a tendency to treat the broken down tissues by incision and curettage, and also the closing up of the wound afterward. This was just what he had advocated in his paper. He was of the opinion that it was dangerous to say that a so-called tuberculous abscess should be opened and drained. Possibly the statistics presented by Dr. Thorndike emphasized this, because they showed such a large number of sinuses in the out-patient service. He had met with no such number of discharging sinuses in an out-patient service in the Children's Hospital in Toronto. Where an abscess appeared to be progressing, the case was sent into the hospital, was thoroughly curetted and closed up, and after a certain length of time the patient was returned to the outdoor department. Reference was made to a case in which he felt certain that the head of the bone had separated. On cutting down upon it, he found not only this sequestrum, but the neck of the bone of a worm-eaten appearance and apparently entirely beyond the possibility of recovery. Not having the consent of the parents for a more extensive operation, he curetted the parts and swabbed with pure carbolic acid. The wound was closed temporarily. Much to his surprise, the whole of the disease subsided, and the child made an uninterrupted recovery; and there was now a very large amount of motion, much greater than he had anticipated.

Dr. **Goldthwait** said he hoped that in publishing the discussion the word "combined" would not be lost sight of, because this seemed to him to be a very large part of the treatment. The disfavor in which exsection had been held in the past was probably because the general surgeons considered the patients cured as soon as primary union had taken place, when some of the tubercular disease must still be present. Dr. Taylor had combined operative treatment with conservative mechanical treatment, thus protecting the vulnerable joint for a sufficient length of time for complete cicatrization to take place.

Dr. E. H. **Bradford**, of Boston, said he desired to emphasize what had just been said by Dr. Goldthwait. He was sure Dr. Taylor did not advise going back to the old way of curetting, putting up in plaster of Paris, and after a few months pronouncing them cured. The after-treatment was very important. He understood Dr. Taylor to say that, when there was more detritus than nature could take care of, one should cut down and remove this. The objection to this method was that one could not treat the hip joint like the knee or ankle, as the acetabulum cannot be thoroughly curetted in many instances.

Dr. B. E. **McKenzie**, of Toronto, thought the constitutional treatment referred to by Dr. Packard should receive more attention. It had been his experience in Toronto, where the condition of the poor was better than in some larger cities, that, when the patients were kept in the orthopedic hospital for a short time, their condition improved, and on sending them home their condition became worse again, necessitating readmission to the hospital. At this season of the year these patients were kept in tents at the hospital, the sides of the tents being rolled up, if desired. These patients lived outdoors both summer and winter, the tents being heated in the cold season to about 50° F. Those who had not tried this plan of treatment would be surprised to note the good effect of this mode of treatment. Dr. Taylor had made a plea for giving up the prolonged treatment, and avoiding the atrophy resulting therefrom. The speaker thought Dr. Taylor was right in a large measure, but feared he would overstep the bounds. Sometimes much atrophy was apparently due to trauma. For example, a woman of thirty-eight, who had been well up to two months, when she fell and struck the left trochanter on the sidewalk, developed a marked atrophy. When he saw her, two weeks later, there was an atrophy of 1¼ inches.

Dr. **Ridlon** desired to put on record a case showing the other side of the question. He said that yesterday he had seen with Dr. Taylor a large number of these cases, and he had no doubt of the excellent work done by Dr. Taylor according to this method. Some years ago Dr. Mudd, of St. Louis, did this operation of erasion on a boy, K. S., and he was treated by Dr. Hodgen for over a year by traction with a hip splint. The case then came under the care of Dr. A. J. Gillette, who treated him for about one year. The boy then came under the speaker's care, and was treated by the long-traction hip splint. The wound had remained closed ever since the operation. After two years of treatment with the splint the case was seen by Dr. Mudd, who advised removal of the splint; but it was not removed until a year later. Within a fortnight there was a flexion deformity of 45° and absolutely no motion, and such great tenderness that the boy could not walk. Traction in bed for three weeks corrected the deformity, and the range of motion again returned. He had treated the case for another year and a half, and again took off the splint. There was a range of motion of a little less than half in all directions. Slowly the hip stiffened up, and the leg finally had a shortening of 2 inches. Sensitiveness gradually passed away, and the boy walked for a year with a crutch. At the end of three years' walking without any protection, the boy died of tubercular meningitis. It was, therefore, not possible to cure all of these cases or to get the good results that had been obtained by Dr. Taylor.

Dr. G. G. **Davis** said he would like Dr. Taylor to define very clearly the cases in which he would advocate the operation, and the time for it. In endeavoring to follow up a sinus to its focus, he had not personally secured much success. He agreed with Dr. Bradford that the X-ray was not always reliable, because it did not show just what the disease was. In one case, which he recalled, the X-ray photograph showed marked disease of the head and neck; but on cutting into the joint he had found absolutely no pus in the joint, and the head and neck apparently healing. The only indications of really active disease were extra-articular.

Dr. **Weigel** asked the method of procedure when the disease was limited entirely to the acetabulum. In this connection he would present the picture of such a case, to show also that bone atrophy does occur in the early stages long before it could be attributed to non-use,—a very important point to be borne in mind. Sometimes the amount of atrophy of bone and the arrest of its growth were due to the extent of the disease, and were not greatly modified by the length of time protection was used.

Dr. **Packard**, in closing, said that he had intended to say that, usually, he mobilized the joint for a year or more, but he wished to emphasize the fact that earlier functional use was often possible.

Dr. **Taylor** said that Dr. Bartow had evidently misunderstood him with regard to the mechanical after-treatment which he always used in conjunction with the operation. With regard to the questions of Sir William Hingston, he would say that the anterior incision was employed in order to do as little damage as possible to the muscular structures. The incision passed through the intermuscular septum and down to the capsule. Drainage was not employed except a small wick passing down to the lowest point of the bone cavity, to allow the escape of serum and blood. This was removed on the third or fourth day. *Thorough* erasion was indicated, if it were done at all, and hence not only should the débris be removed, but the walls thoroughly curetted, and then disinfected before closing the wound by suture. Prolonged mechanical protection was, of course, essential. He made use of a spica of gauze, and then made traction high up on the thigh. With regard to cutting beyond the area of the disease he would say that he worked with the X-ray photograph at his side, using this as his guide. He certainly did go a little beyond the diseased area; but he trusted to the disinfectants, together with the subsequent circulatory changes, to complete the destruction of the bacilli in the walls. If a person fractured the leg, and it was put in plaster for six weeks, on the removal of the plaster the part would not be found in a condition for weight-bearing. Hence he did not agree with Dr. Shaffer that power of weight-bearing should be our guide in removing the brace. We should be guided by the joint symptoms. Reference had been made to wiping out the cavity with carbolic acid. His own method had been to fill the cavity with carbolic acid or formalin solution, and not merely swab it out. Moreover, a sharp curette was employed. The keynote of the paper was certainly the *combined* treatment, as stated by Dr. Goldthwait. The tubercular cavity should be cleaned as thoroughly as possible. With regard to post-mortem X-ray examinations, in reply to Dr. Bradford's question, he said he had had no experience, and did not know that the same result would be obtained with the X-ray under such conditions. The clouding, he had always thought, was due to a circulatory condition. In the case referred to by Dr. Ridlon he would judge that the after-treatment had not been sufficiently protective or watchful enough or the original erasion sufficiently radical. In the acetabular cases referred to by Dr. Weigel one could go outside of the neck and reach the region. Sometimes the upper part of the head would have to be chiselled away in order to gain access to the disease. Primary acetabular disease is, however, rare, and the exception.

VI.

A NOTE ON THE FOOT OF THE AMERICAN NEGRO.

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CINCINNATI, OHIO.

It would appear that the wide-spread notion of the flatness of the negro's foot had its origin in this country. The bones of the negro's normal foot differ in no regard from the white man's, as far as their individual shapes are concerned, excepting that of the os calcis, the length of whose posterior process is admittedly greater in the negro. Nevertheless, the flatness of the negro's foot has become proverbial, and has given rise to the saying that "the hollow of his foot makes a hole in the ground." As a racial characteristic of the aboriginal negro, the flatness of the plantar arches has been disproved by Herz and Muskat in recent publications. The former has shown conclusively, in a large number of observations made in Africa, that a well-developed and easily apparent plantar arch exists far more constantly in the negro, as there found, than in an equal number of Europeans. While this is doubtless true, there can, on the other hand, be little uncertainty that the homely observation of the contrary condition in the American negro has some basis in fact. Abundant opportunity for superficial examination of adult negro feet in this country brings with it the impression that flat foot is present in the negro with unusual frequency as compared with the white. The present investigation is offered as incomplete, in so far as the number of observations is too small for binding conclusions, but as being rather convincing in its results, nevertheless.

There were used as material for the observations herewith presented 88 feet of adult negroes, who were walking patients in the wards of the Cincinnati Hospital. A large proportion of them were under treatment for venereal disease. Eight of these 44 were women. The men were practically all engaged

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in heavy laboring occupations. Impressions of the feet were taken by the iron and tannic acid method. Attention was paid particularly to the flatness as shown by the impression and to the condition of the great toe. Of this series but 16.2 per cent. of the feet lacked both hallux valgus and marked flattening of the arch. Hallux valgus without descent of the arch was present in 27 per cent., while marked flat foot was observed in 56.8 per cent. Of the cases of flat foot, 92 per cent. had accompanying hallux valgus.

For the sake of comparison a series of impressions of the feet of white patients was taken. Their occupations were noted, and were found to be about the same as those of the negroes. Thirty-four feet were examined in twelve men and five women. Of this number 59.2 per cent. had neither hallux valgus nor flat foot. Hallux valgus without flat foot was present in 35 per cent., while but 5.8 per cent. had flat foot, being two cases in both of which hallux valgus was present. It was furthermore noted that 41 per cent. of the white feet presented hallux valgus, with or without flatness, while in the negroes this percentage was 79.5. This frequency of hallux valgus seems of especial importance, since it may be considered purely as the result of deforming foot-gear.

Although, as before remarked, the number of observations is too small for definite conclusions, the variation in the figures is quite striking. Not only is flat foot much more frequent in the negro, comparatively speaking, but distortion of the great toe is relatively twice as frequent as in the white.

In the belief that an interesting comparison would result, impressions were taken of the feet of twenty colored children between the ages of thirteen and three years. Of the forty feet examined, 75 per cent. had normal feet, 25 per cent. had flat foot, of which 80 per cent. were associated with hallux valgus. Hallux valgus was present in 25 per cent. of the whole number.

By far the greater number of negroes in Cincinnati have more or less admixture of white blood in them. On this account note was made of the color of all the adult negroes examined. There were noted as dark, 34; as of medium or light color, 54. Of those noted as dark, 53 per cent. had flat foot, and 70.5 per cent. had toe valgus. Of those classed as medium and light, 59 per cent. had flat foot, while 87 per cent. had toe valgus. It would thus appear that these deformities were somewhat more frequent in the lighter-colored than in the dark, although the difference cannot be considered great. In fact, it appears that, considering the small number involved, this difference can be ignored.

Were the number of observations sufficiently large, it would seem justifiable to draw the following inferences:—

1. Flattening of the arch of the foot is much more frequent in the American negro than in his white neighbor.
2. Hallux valgus is likewise more frequent in the negro than in the white American.
3. The well-arched foot occurs in the American negro with sufficient frequency to establish it as the normal.
4. While flattening of the arch is more common in the negro child than in the white, the normal foot preponderates decidedly.
5. From this it would be fair to conclude that the flat foot of the adult American negro has developed after the period of childhood in the greater number of cases.
6. The deforming effects of footwear are much more evident in the adult negro than in the white man of the same class. This is shown by the fact that decided valgus of the great toe is much more frequent.

There require to be explained the cause of the frequency of flat foot in the negro child and its increase in adult life. The great frequency of rickets in negro children is well recognized, and its manifestation in bow-legs and knock-knee is quite familiar. This alone would account for a considerable portion of the flat foot in children. However, it will be noted that even in these hallux valgus was present in 80 per cent. of the flat-footed. This, together with the marked frequency of hallux valgus in the adult, would make it seem likely that the effect of shoes in distorting the feet is especially marked in the negro, both child and adult.

This might be explained by the fact that the negro foot is wide in its anterior portion, and therefore especially prone to compression. The length of the heel would, however, seem also to merit consideration. It would have the effect of shortening the shoe for the fore part of the foot, since it virtually displaces the ankle forwards. It would seem that a negro's foot cannot be covered with a white man's shoe with impunity.

Should future investigation agree with the above findings, it would become necessary to abandon the idea that a flat plantar arch is an hereditary and racial characteristic of the American negro; but this condition would have to be regarded, in part at least, as the injurious result of shoes of improper construction.

The excuse for presenting so incomplete an inquiry is to stimulate further research into a question of importance, not only in its purely ethnologic aspects, but also as it pertains to the theory of development of one of the most frequent deformities of all civilized people.

	ADULT NEGRO.	ADULT WHITE.	NEGRO CHILDREN.
Number examined (feet)	88	34	40
Percentage of flat feet	56.8	5.8	25
Hallux valgus without flat foot . . .	57%	35%	5%
Without flat foot or hallux valgus . .	16.2%	59.2%	75%
Hallux valgus present in	79.5%	41%	25%
Of flat feet, hallux valgus present in .	92.0%	100%	80%

VII.

A STUDY OF A CASE OF LATERAL CURVATURE OF THE SPINE: A REPORT ON AN OPERATION FOR THE DEFORMITY.

From the Orthopedic Department of the Presbyterian Hospital, Atlanta, Ga.

MICHAEL HOKE, M.D.

Lateral curvature of the spine without bone deformity is a simple problem. Lateral curvature with osseous deformity in children, whose bones are very flexible, though a more difficult problem, permits correction to a greater or less extent by properly fitting plaster jackets. Osseous deformity in children, adolescents, and adults, whose bones are stiffer and less yielding, has permitted very little, if any, correction. The method of treatment has been about the same as for the younger flexible cases,—plaster jackets, removable jackets, exercises, and various combinations of these. The figure of most of the severest cases is as bad when wearing apparatus as when unsupported.

Like all orthopedic surgeons, the writer has been harassed by the uncertainty of prognosis,—*the knowledge that, save in the very young cases, the osseous deformity would not be affected at all by exercises and jackets.*

Fourteen months ago the study of this case was begun,—an effort to find some operative means by which the deformity of the ribs could be changed, the hump decreased, the depression in the back filled in.

The facts recorded here did not come in the sequence with which they are connected in this paper. Many experiments were made which proved to be valueless. Many designs of instruments and apparatus other than those shown in the illustrations were made, with no result save to indicate how better ones should be made.

Presented by invitation at the meeting of the American Orthopedic Association, Washington, D.C., May 11-14, 1903.

In this case a change in the bones has been made. A result, though far from perfect, has been obtained, which was not possible without the operative procedure herein reported. The writer is not yet through with the case; but he feels that, with due regard for that conservatism which should always control one's judgment, he may report the work done in connection with this case.

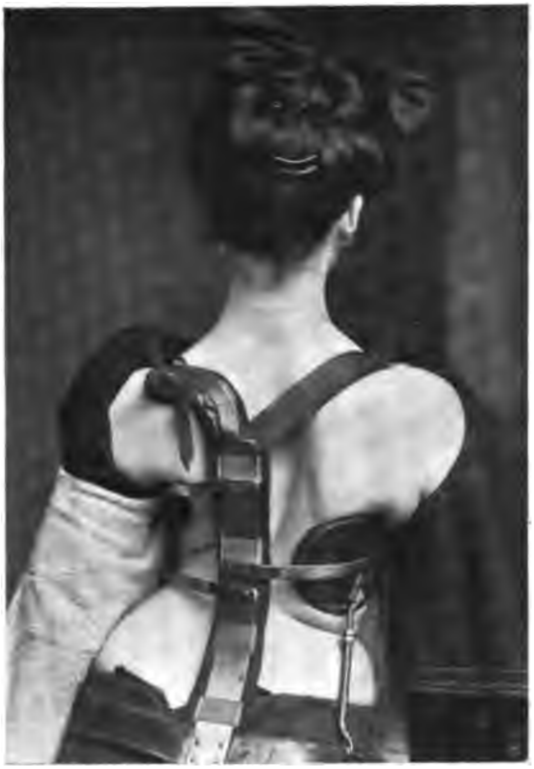


FIG. 1.

Patient.—Age, sixteen years and six months.

Complaint.—Curvature of the spine.

Past History.—Measles at ten; mumps at thirteen; whooping-cough at six; malaria every spring from nine to thirteen; scarlet fever at eight,—a very mild attack; "gastritis" at thirteen,—attack lasted two months; has always been delicate.

Present History.—May 1, 1902. History of deformity: When she was eight years old, the dressmaker first noticed that one hip and one side were larger than the other. Nothing was done to correct the condition until she was nine years old, when a physician was consulted, under whose care she remained until she was twelve. During these three years she was frail. Exercises were prescribed, which were taken mainly with dumb-bells, pulleys, and other machines. The posture habit received no attention. Her general condition received no medicinal treatment. Under this treatment she thinks the condition remained the same. During this period the deformity was not very noticeable when the clothes were taken off. Observed with the clothes on, the condition was not noticeable. She then went home, and continued the exercises one year. During this period she got worse.

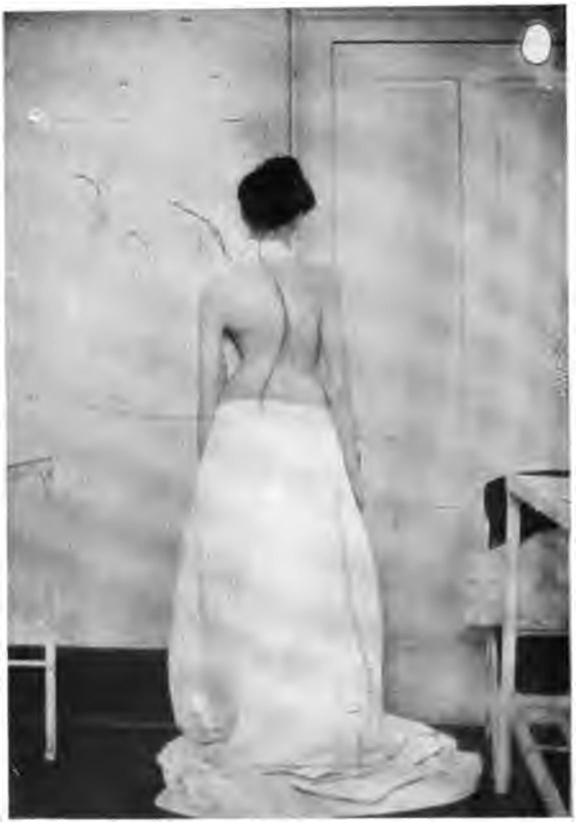


FIG. 2.

She was then taken to an "Institute." A brace was applied, exactly like the one shown in Fig. 1. She went home, and came back again at the end of six months to have the pads on the brace changed. During these months she got very much worse. She then returned to the "Institute" to be treated. She remained there one year. The back was steamed, electricity, "two kinds," was given every day, exercises were taken chiefly with machines. She got worse during this time.

Examination:—

(a) *General Condition.*

Patient is pale, nervous, tongue coated, constipated, tired all the time, has headaches frequently, sleeps badly.

Heart sounds normal, areas of dulness normal, apex within nipple line, pulse 92 to minute, lungs normal, hemoglobin 65 per cent., no count of corpuscles. Abdomen negative. Urine negative.

(b) *Posture and Curve and Conformation of Body.*

See Fig. 2, kodak picture taken May 16, 1902.

The patient stands with her head inclined toward the right. The right shoulder with pendent arm goes forward: the inferior angle of the right scapula is very prominent, projecting backward about two inches further than the left. The left shoulder with the arm is backward towards the spine: the inferior angle of the scapula is not so prominent as it should be, and lies close to the spine. The left hip is very prominent and forward: it is higher than the right, which is back of its normal position. The weight of the body is thrown on the right leg. When she stands with feet together, the left leg appears shorter than the right. The left heel does not touch the ground. Measurements of the two legs show no real shortening. The apparent shortening is due to tilting of the pelvis and adduction. The outline of the left side shows a deep concavity; that of the right side is slightly convexed; the left nipple is a little lower than the right. Over the splenic area the anterior part of the left ribs forms a decided prominence. The left ribs from the fourth to the twelfth are displaced (rotated) forward, so that the area of the thoracic wall in the back formed by these ribs is deeply sunken. This is produced by the fact that the left ribs are rotated forward, and their backward-arching from the angle out has been flattened. This is shown in Fig. 3, in which the patient was photographed as she was bending forward. The deepest portion of the sunken area lies (presuming the patient to be standing) in front of and below the inferior angle of the scapula. (See crease in skin in Fig. 1, photograph with brace on.) The fifth and sixth ribs are displaced (rotated) further forward and flattened more than the others involved on the left side of the spine.

The ribs on the right side from the fourth to the twelfth form a prominence. This decided deformity of the right ribs is seen in Fig. 3. The prominence is produced by rotation backwards of the ribs and by the fact that the normal-postero-convex curve of the ribs near the angle has been greatly increased.

The curve of the spine is an S-shaped one, extending throughout the length of the spine.

Beginning at the base of the skull, with the head inclined to the right, the spine curves to the left to the first dorsal,'then slightly to the right to the fourth dorsal, then very acutely to the right, as if, with the articulation of the fourth and fifth dorsal vertebræ as the plane of motion, the section of the body from the fourth dorsal vertebræ (inclusive) up had been shifted to the left upon the lower segment (from fifth dorsal vertebra, inclusive, down).

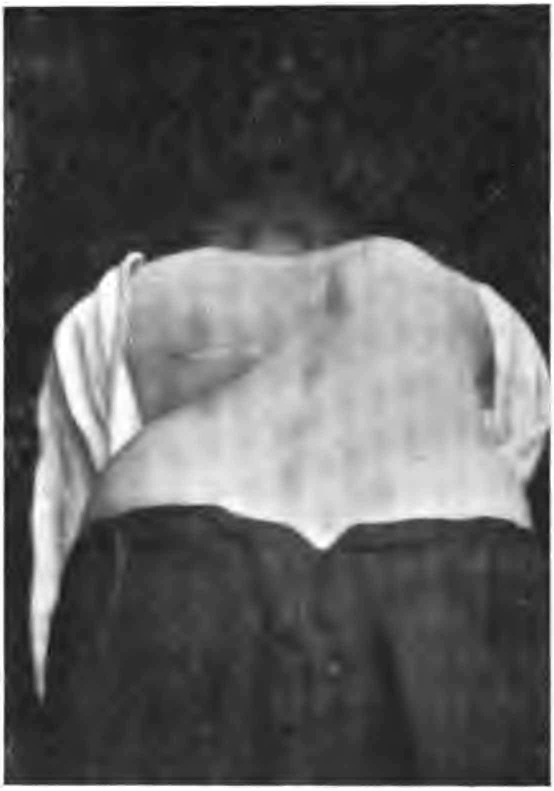


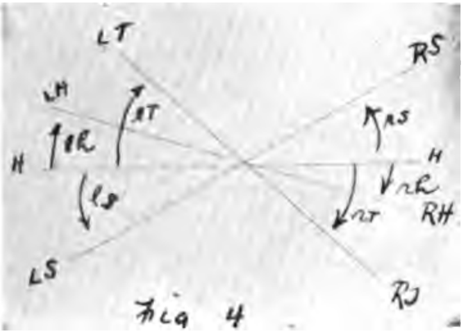
FIG. 3.

Thus the fifth spine is about one inch below and to the right of the fourth spine. Then this curve to the right continues to the eighth vertebra, at which point it turns to the left, crossing a plumb at the twelfth, and continues into the lumbar region.

The patient sits with the head, shoulders, arm, and hips in the same position relative to one another as they are when standing. The normal lumbar curve has been greatly increased, so that the patient, when standing, is very "sway-back." The costal margin in front is for that reason very prominent.

If a perpendicular plane is let fall through the transverse diameters of hips, shoulders, and chest of a normal individual, these planes will be approximately parallel. Here they are inclined to one another.

Fig. 4.—Let line HH represent the projection of a plane passed perpendicularly through the transverse diameter of the hips in the position they ought to occupy. Pass similar planes through the transverse diameters of the hips, thorax, and shoulders in their present positions, and project them upon the ground. Let line HH be the basis from which the rotations of the hips, thorax, and shoulders of the patient, can be approximately estimated. Then LH, etc., represent the positions of left hip, left side of thorax, and left shoulder in the postures the patient assumes in sitting and standing, and the arrows *lh*, etc., the directions in which the left hip, etc., have rotated. RS, etc.,



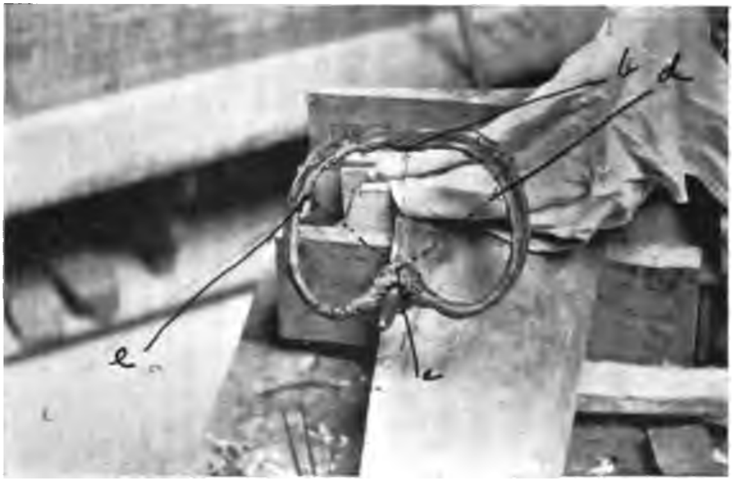


Fig. 5.

represent the right shoulders, etc. The torsion in the body can be appreciated from this diagram, which is only an eye estimate of the rotation of the parts mentioned.

There is no rotation forward, and consequent flattening of the left first, second, third, and fourth ribs, and no bending backward of the first, second, and third ribs on the right side. The curve backward in the fourth rib on the right is a little increased, but not enough to be striking. The section of the chest above the fifth rib may be regarded as structurally symmetrical, though it shows a postural curve. Below this segment the asymmetry of the skeleton has been produced.

The greatest change in the spine is at the fifth, sixth, seventh, and eighth vertebræ. These vertebræ are rotated more to the right than the others. The deepest part of the sunken area in the left side arises from the fact that the fifth, sixth, seventh, and eighth ribs are displaced farther forward and flattened more than the other ribs on the left side. The greatest amount of bending backward of the ribs on the right side has occurred in the fifth, sixth, seventh, and eighth ribs. The section of the thorax formed by these vertebræ and ribs has become most markedly deformed.

The segment of the chest from the fourth to the eighth vertebræ seems to take no part in the motions of the spine: this section seems fixed. The spine is unnaturally flexible at about the tenth dorsal to the second lumbar vertebra. Lateral flexion of the body is accomplished mainly by the motion between the tenth, eleventh, and twelfth dorsal and first lumbar vertebræ. The trunk can be laterally flexed to the right about half as far as the left.

The experiments below were made upon a *cadaver* taken without selection from a number in the head-house. The body was that of a man, who had been a laborer. The ribs were thick, hard, and resistant, the ligaments strong.

The muscles of the back were cut away. *The sternum with the ribs attached was left intact.* The thoracic viscera were not removed. The pelvis was made steady in a box.

The bony part of the thoracic cage is made of vertebræ, cartilages, ribs, and sternum. Let a "thoracic element" be a vertebra, and its attached ribs not united or united in front by the sternum, or indirectly by attachment to the costal border. The shape of such an element is shown in Fig. 5. Fig. 5 is a photograph of the fifth element taken from the subject after the experiments below were made. Mark the centre of the vertebra, mark the opposite point on the sternal portion of the element. Find points on the ribs equally distant from the sternal point. These points are equally distant from the centre of the vertebra.

Fig. 5. If *bd* and *be* are equal, then *ad* and *ac* will be equal. The symmetry of the figure is striking. Support the element upon a rod in the position of its antero-posterior diameter. The element balances long enough to be photographed. (See Fig. 6.) These two experiments were made with the first, second, third, fourth, and fifth elements. The results were analogous in each instance. The first seven elements are to be called "closed elements" (complete bony rings) for the reason that the ribs of each are united to their fellows by the sternum. These elements are rigid, and they are rigidly held together in the front by the sternum. The firmness of the thoracic cage

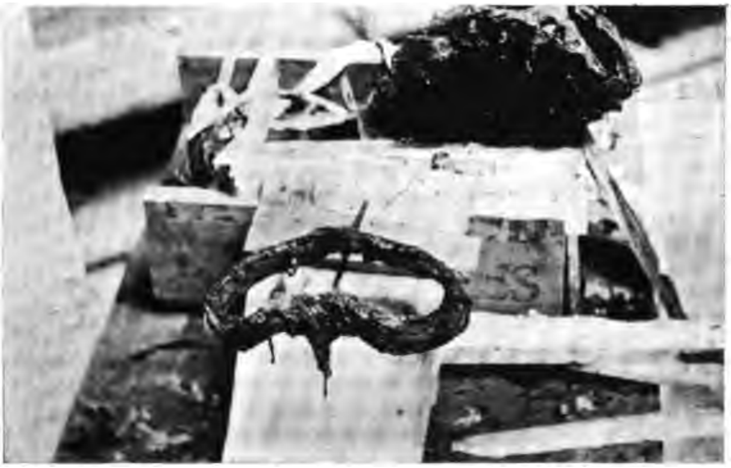


Fig. 6.

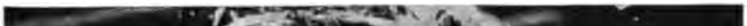


Fig. 7.

behind, along the spine, must depend upon the rigidity of each element, and the firmness with which the neighboring vertebræ and ribs, out as far as the angles, are held together by the various ligaments.

The eighth, ninth, and tenth elements are indirectly "closed," since they are joined to the continuous costal border; but these elements are of necessity not as rigid as the first seven. The eleventh and twelfth are not "closed."

Fig. 7 shows the subject with straight spine and symmetrical thorax sufficiently suspended to keep it from bending forward.

Fig. 8. The thumb of the left hand is pressing forward upon the end of the left twelfth rib. The end of the left twelfth rib could be pressed forward easily some little distance. The index finger of the right hand points to the right twelfth rib, which rotated backward. Pressure forward was made upon the left eleventh and upon the tenth ribs at the angle in the same manner. There was much less discursion forward of the left tenth rib than the left eleventh and twelfth, less rotation backward of the right tenth rib than of the right eleventh and twelfth ribs when subjected to analogous pressure conditions. Pressure forward upon the left ninth, eighth, seventh, and sixth ribs, gave progressively less discursion forward of the ribs pressed upon than was seen when the foregoing ribs were similarly pressed forward, and progressively less rotation backward of the corresponding right ribs. In the eighth, seventh, and sixth ribs the movement produced was very slight. Extremely little rotation of the vertebræ was produced.

Fig. 9. The eighth rib was completely severed at the point marked by the thumb in the illustration. Forward pressure was made by the thumb upon the end nearest to and still attached to the spine. This end could be pressed forward three-quarters of an inch or more easily. There was a little deflection of the eighth vertebral spine to the left, indicating rotation of the vertebral body to the right, perceptible to the eye, but not enough to show in the photograph. There was also much more rotation backward of the eighth and ninth ribs than was seen when pressure was made at the same site before the rib was cut.

The index finger is making pressure at the same site as the thumb in Fig. 10. The second finger points to a discursion forward of the rib below (pulled forward by the anterior corto-transverse ligament between it and the vertebra above). This was perceptible to the eye. The movement was, however, not sufficient to show in the photograph.

Fig. 11. The left seventh, eighth, ninth, and tenth ribs were cut where the rib turns forward. Pressure was made by the fist upon the ends nearest the spine. These ends could be easily pressed forward an inch. There was enough rotation of the vertebræ to the right to be shown in the photograph (see deflection of spine of the vertebræ to the left). There was quite a good deal of bulging backwards of the corresponding ribs on the right side. The rotation of the ribs backward on the right was much greater relatively than the discursion forward of the fragments pressed upon by the fist. The corresponding clinical observation (the relatively greater hump on one side than depression on the other) can be made by the examination of any osseously deformed case. It was far easier to bend the spine laterally than it was before the ribs were cut.

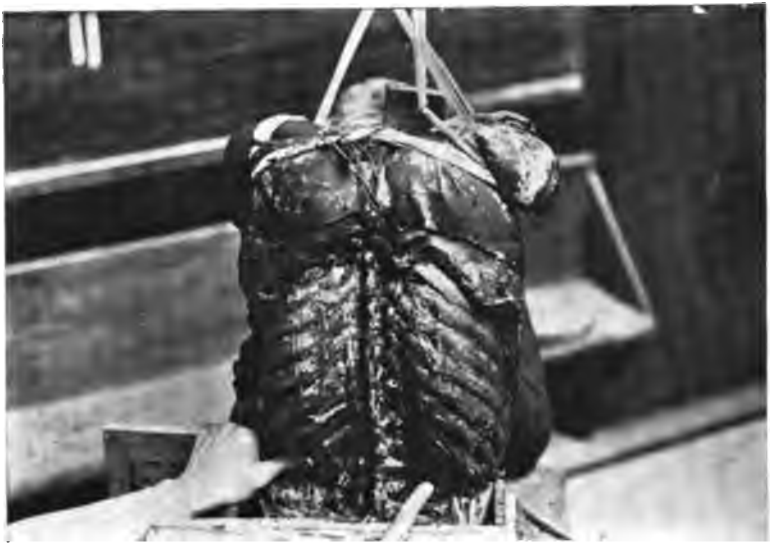


FIG. 8

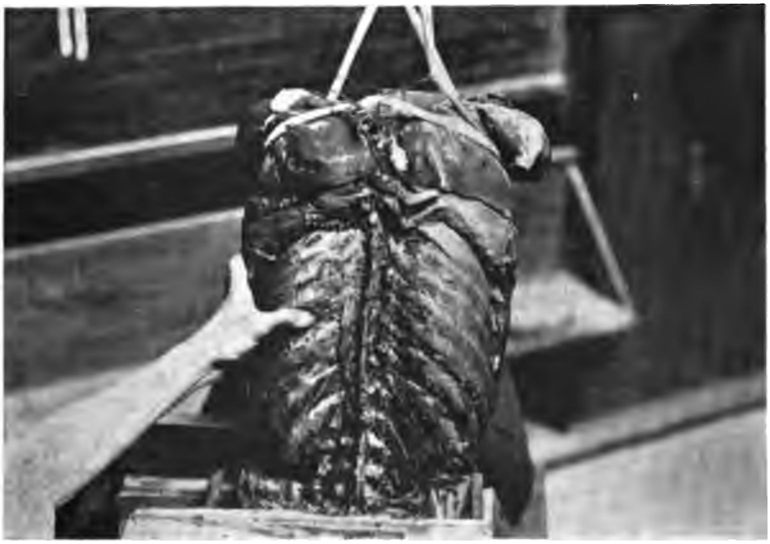


FIG. 9.

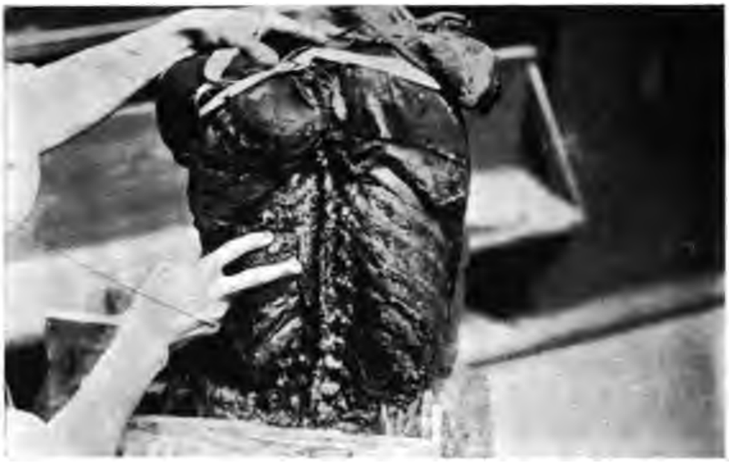


Fig. 10.

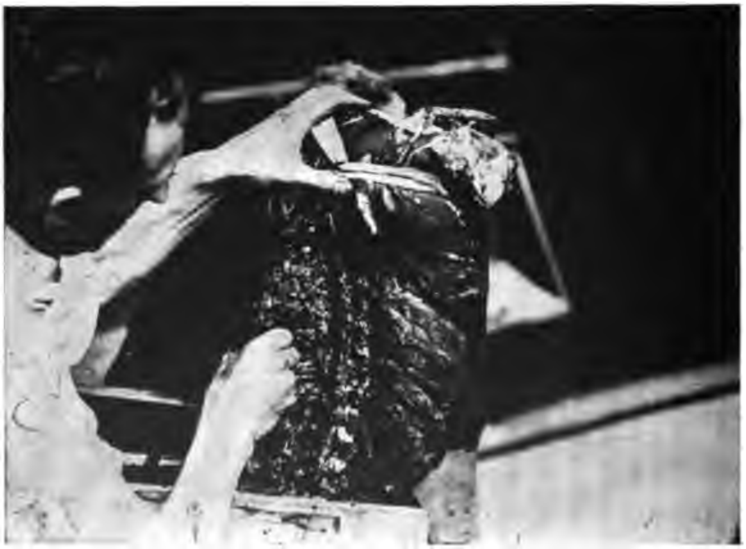


Fig. 11.

Fig. 12. A knife was passed between the transverse processes on each side of the vertebral column towards the spine, cutting the anterior corto-transverse ligaments. The weight of the thorax easily curved the spine laterally, and rotation of the elements was vastly easier. The eleventh and twelfth elements are not closed figures.

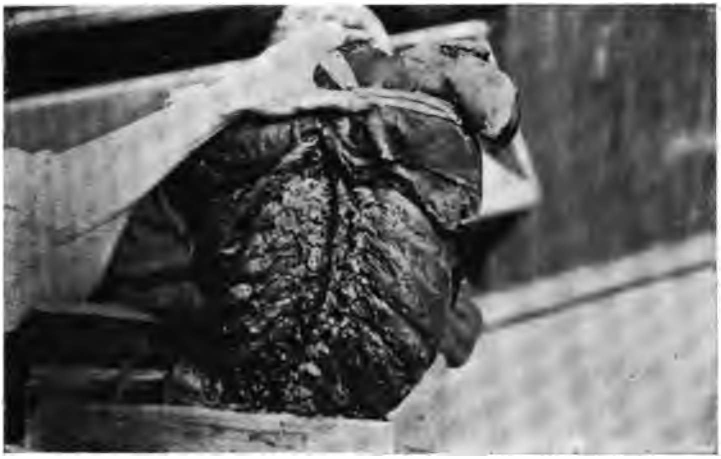


FIG. 12.

Deductions.

Pressure forward at *a* through the mediation of the middle costo-transverse ligament and vertebra rotates the vertebra to the right and the opposite rib backward. A slight rotation of the vertebra is sufficient to produce a greater arc of motion at *b*, since *b* is the end of the long arm of the lever. A closed element, since it is a bony ring, cannot give in to pressure at a point without yielding somewhere else in the ring. The ribs in the closed elements are to be regarded as props to the spine. They are forces, since they transmit the weight of the thorax, its contents, the head and upper extremities, to the spine. In the normal, symmetrical, closed element the force of corresponding right and left ribs is applied to the spine in the same plane. (See Fig. 14, arrows *a* and *b*.) They must balance one another.

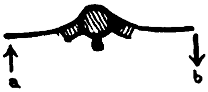


FIG. 13.

When forward pressure was made near the left angle of the rib of a complete closed element, the ribs of which were thick and resistant, there was extremely little yielding at the point of pressure, and extremely little rotation of the attached vertebra, and extremely little rotation backward of the opposite rib, because the element was rigid, it would not yield to pressure. When, however, the left rib of a closed element was cut and forward pressure was made on the fragment nearest the spine, that fragment could be easily pushed forward three-quarters of an inch or more, the attached vertebra could be rotated to the right, and the corresponding right rib rotated backwards. In other words, pressure at *a*, Fig. 15, produced rotation of the vertebra in direction of arrow *b* and greater rotation backward of right rib in direction of *c*. Here, again, the greater discussion at *c* appears, as the result of this point being at the end of the long arm of the lever. Thus, if the ribs are firm, pressure forward on the angle of a rib can but little affect the figure of the element by producing yielding at the point of pressure and rotation of the vertebra. But, when the equilibrium of the forces on either side of the vertebra (from integrity of the ribs) is destroyed by cutting a rib, then it is possible to rotate the vertebra to produce backward motion of the angle of the rib opposite to the one cut. Pressure at *c* produced rotation the reverse of that produced by pressure at *a*. The same result was obtained, as mentioned above, but to a greater degree, progressively, as more ribs were cut, the ligaments being still undisturbed, Thus, so long as each element is symmetrical and unyielding, the ribs possess their incremental power of preventing lateral curvature, rotation of the spine, and deformity of the thoracic cage. But, if an element yields, the ribs being flexible or having been made so artificially, then by pressure at the right place one may influence the element by corrective force. Each rib in a symmetrical element must equally oppose the force of its fellow on the opposite side, the two ribs equally bracing the vertebra.

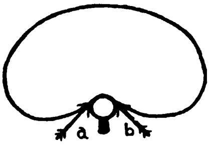


FIG. 14.

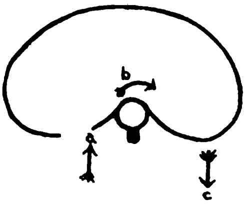


FIG. 15.

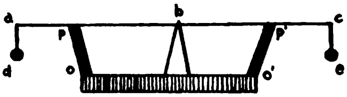


FIG. 16.

When the anterior costo-transverse ligaments connecting a number of elements were severed with the knife, it was very easy to bend the spine laterally, and to rotate the whole thoracic cage to an extent limited, but greater than normal.

Let *abc* be a rod resting at its centre *b* upon a pivot; *d* and *e* are equal weights suspended from the ends; *xy*, a pedestal; *op* and *o'p'*, slightly elastic bands of equal size. Depress *c*, remove the pressure: as a result, the rod will oscillate and finally come to rest.' Add to the weight *e*, then *c* will descend in some proportion to the weight added, and the yielding of elastic band *op*. Remove additional weight, the rod will oscillate and come to rest again. Turn back, and look at Fig. 7, a symmetrical element balancing on a rod. All symmetrical elements are balanced, and a symmetrical thorax is balanced upon the spine.

Observe the analogy of Fig. 17 with Fig. 16: *x* equals pedestal and pivot, a vertebra of an element; element *abc* and elements above and head and extremities above pedestal and pivot are comparable to rod *abc* and weights. A similar relationship exists between all elements. Then the anterior costo-transverse ligaments and the muscles of the back and side of trunk correspond to the elastic bands *op* and *o'p'*. Think how a bad posture may affect this figure, adding more weight to the right or left side of the spine. The other ligaments of the spine were left intact in the above experiment (producing lateral bending so easily after the anterior costo-transverse ligaments were cut), and likewise the fascia between the ribs from the angle of the ribs to the sternum. These must likewise play their incremental part in holding the symmetrical elements together. It did not seem worth while—likely it could not be done—to try to determine exactly what part each one of these ligaments played in holding the frame upright. All play their part, but it seemed that among the ligaments the anterior costo-transverse must play a very prominent part in preventing lateral bending and rotation beyond a certain limit, regarded by the eye as normal; and how far the rotations occurred, except "much" or "little," seemed immaterial, too,—a detail that would vary with every *cadaver* and every living subject, dependent (presuming them to be symmetrical) upon the thickness and consequent rigidity of the subject's ribs and upon the strength, length, and elasticity of the anterior costo-transverse ligaments mainly, and other ligaments of the spine and attached ribs, and the fascia between the ribs.

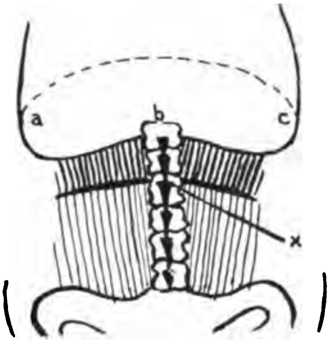


FIG. 17.

Think how easy it is to bend the neck in any direction, and to rotate it: there are no ribs there. Think of the mobility of the lumbo-dorsal junction: there are no closed elements there. Notice the fact that between the shoulder blades there is less mobility than in any other part of the spine. In this thoracic section are found the most rigidly closed elements, joined in front by the sternum. The component ribs are thicker, wider, stronger, and less yielding than their fellows in the thoracic wall. Observe the skeleton of a symmetrical subject. (See Fig. 18.) The symmetry of the bony cage thorax is really marvellous. Take any point on a rib. Find analogous point on

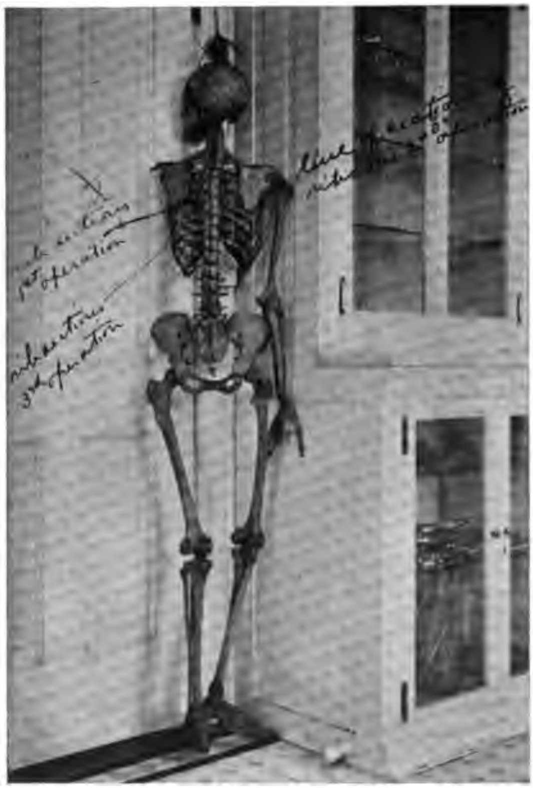


FIG. 18.

its opposite fellow. These two points are equally distant from the spine; and, if not in the same horizontal plane, they are very near it. Corresponding intercostal spaces are of the same width at corresponding points, etc.

The following facts are of great importance. The distance from the head to the angle of the ribs increases from the first to the eighth, and then decreases again. At the angles the ribs turn forward: thus the surface of the cage from the first eight angles forward forms a plane inclined forward and outward. These angles lie beneath the vertebral border of the shoulder blade. Naturally, on a symmetrical subject standing erect the shoulder blade glides forward to a normal degree over this inclined plane. If the shoulder on the normal thorax should glide backwards, it must ride over an eminence. The two upper extremities form a good portion of the superincumbent weight upon the spine. The posture of the shoulder within certain limits is subject to normal variation. Departures from the normal posture of the shoulders produce an asymmetrical distribution of the weight of these extremities upon the spine. It has been demonstrated that weight falling obliquely upon the spinal column can produce a rotary lateral curvature. (Bradford and Lovett, "Orthopedic Surgery," 2d edition, 1899, p. 94.)

So long as this patient grew up with no bad postural habit and with fair health, with her ligaments strong enough to keep the thorax balanced, her muscles in good condition, so that they were used co-ordinately, the development of each one of these elements was a symmetrical development, and she was straight. But habitual posture placed the weight of the head, upper extremities, and thorax upon the spinal column obliquely. Bad health, anæmia, kept her constantly tired, her ligaments and muscles weak, her bones soft. She acquired the habit, when standing and sitting, when reading or writing, of holding the head to the right, of rotating the left shoulder backward, the right forward, and left hip up and forward, the right backward. As a result of this, the superincumbent weight fell obliquely upon the column in the direction of the arrow in

Fig. 19. In this picture the patient is photographed standing. The paper arrow stuck on the chest shows the direction of the force of the superincumbent weight. The posture with reference to the spine was one of flexion forward and lateral flexion to the left. Under this influence, acting through a number of years, the spine bent with the convexity of the curve to the right (in the dorsal region). Thus the bodies of the vertebræ rotated to the right; and the ribs rotated and bent, too, until the parts of each thoracic element under the superincumbent weight were acted upon in the direction of the arrows in Fig. 20.

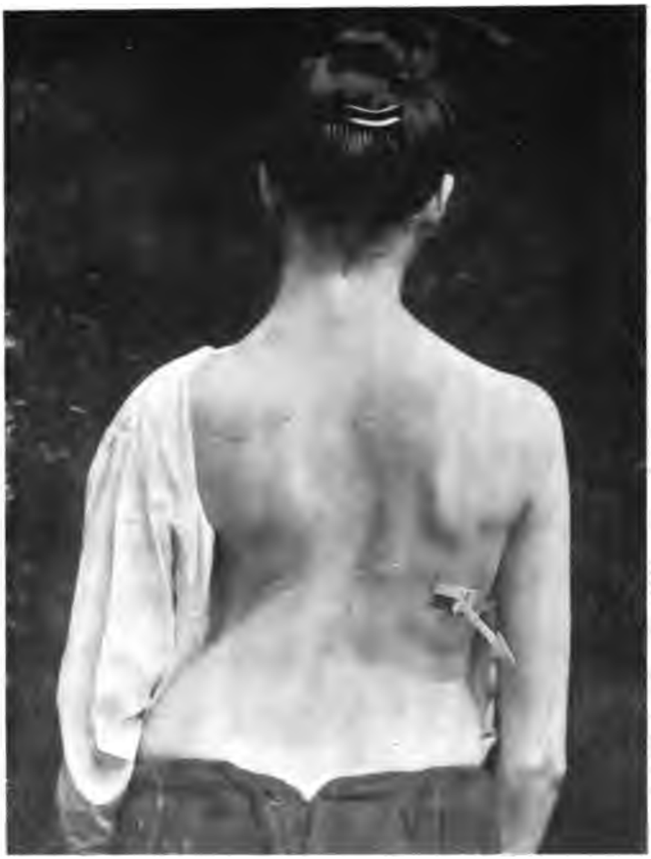


FIG. 19.

Arrow *a* represents the action of the slanting force of the body weight upon each thoracic element from the fifth inclusive down. From this vertebræ rotated in the direction of the arrow *b*; the spine, arrow *c*. The right ribs were acted upon by forces (arrows) *a* and *d*; the left ribs, arrows *e* and *b*.

The body weight acted in this manner for several years. Thus each thoracic element was by these forces changed from the symmetrical shape to the deformed in Fig 21.

In the symmetrical element the two ribs (forces) are attached (applied) to the spine at analogous points on the sides of the vertebræ. Here in this deformed thorax, in these deformed elements, all like Fig. 21, not only were the elements deformed, as shown in Fig. 22, but the direction of the application of the forces (ribs) to the spine was different on the two sides. The point of application of those on the left was anterior to the similar point of application of their fellows on the right; and the forces (ribs) were applied at differently inclined angles, which under the influence of weight must make the chest rotate to the right.

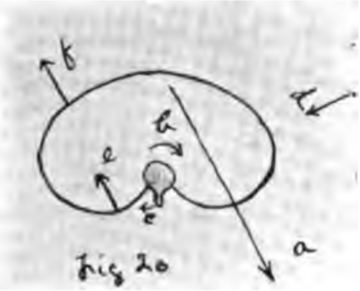


Fig 20

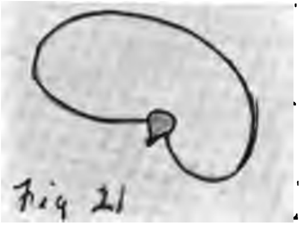


Fig 21

The sum total of the changes in the elements produced the deformity seen in Figs. 2 and 19, standing, and Fig. 3, bending forward. Thus the back to the left of the spine was sunken in from the fourth rib down; to the right of the spine the prominence of the ribs extended from fourth rib down; the chest wall was flattened beneath the right axilla; a prominence was produced over the left costal margin and adjacent part of ribs in front. This combined skeletal deformity and bad posture gave the figure of the patient.

The barbarous brace shown in Fig. 1 held her in this deformed posture, and by vicious pressure upon the thoracic wall increased every feature of the deformity. The photograph illustrates the harm that may be done by such grossly ignorant application of apparatus.

In the beginning the problem was not clear; but, with the hope that it would become clear, the effort for several months —May, June, July, and August—was to render the spine as flexible as possible. Exercises were given daily for three months. These were movements of the lower extremities, symmetrical extension exercises for the back, combined exercises of the legs and abdomen, with the intention of reducing the exaggerated lumbar curve, neck exercises, and arm movements. Suspension was combined with manipulation of the trunk by the hands, in order by counter-rotation (rotation to the left) efforts to stretch the contracted ligaments better.

When the writer, standing behind the patient, grasped her pelvis at the left anterior superior spine with his left hand, and her chest wall over the prominence of the right side with his right hand, and rotated the former backward and the latter forward, a much more corrected attitude could be assumed by the patient,—the back flatter, the thorax more directly over the hips, the depression shallower, the rib bump less prominent, and, when the hands were removed, the body slid obliquely to the right, *and twisted to the right.* When these counter-rotation efforts were made at intervals during the time the patient was exercising in the office, it made it easier for her to exercise in the more correct posture. In other words, when trying to stand straight, to flatten the back, to straighten out the curve, to hold the body directly over the pelvis, what opposed her efforts was the *tendency to twist around the spine to the right,*—torsion,—and in proportion to the degree this was corrected for her by the writer's efforts with his hands was she enabled to assume a better posture; and the reason she could not assume such a degree of improved posture alone was the fact that her own muscles lacked just as much power to rotate the body and spine back towards the normal posture as the writer put in his efforts to assist her. This was sufficient to make him "strain." Some appreciation of the task placed upon her muscles can thus be had. Using all his force, the writer was not able to twist the body much to the left. *There was a great resistance to this effort.*

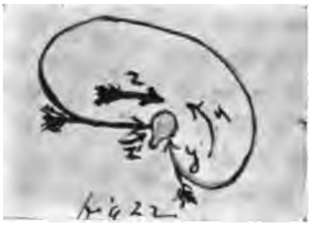
The mechanics of this was as follows (it is most important to understand this clearly):—

It was seen by examination that the width of corresponding intercostal spaces is the same in a normal thorax (fascia and intercostal muscles fill this). The same is true of the space between corresponding transverse processes, which means that the anterior costo-transverse ligaments between corresponding transverse processes and ribs are of equal length, balancing, behind, the anchorage of one element to another. Under the obliquely acting superincumbent weight each element from the fifth inclusive down had been deformed as above, the ribs on the left were crowded close together, narrowing the intercostal spaces (shortening the fascia and muscles), narrowing the left inter-transverse spaces (shortening the anterior costo-transverse ligaments of the left side), and the tendinous attachments of the deep muscles of the back extending across these spaces from the vertebral spine out to the angle. The same structures on the right side of the spine were stretched.

All the exercises could possibly accomplish was to stretch the ligaments, etc., on the left side, and to develop the muscles of the back. The counter-rotation efforts with the writer's hands helped to further stretch all the ligaments, and made it easier for her muscles to hold her straighter. The ligaments having been stretched, giving greater latitude of motion of the parts towards the normal, and the muscles having been toned up, a certain amount of rotation and lateral flexion could be corrected by her muscles. But the bone deformity of each element had not been changed in the least. The left rib of each element was still sunken into the left of its vertebra as much as formerly. It has been shown that the ribs are props to the spine, that each rib is a force acting on the spine, that in a normal thorax, each element being symmetrical and these ribs being of the same size and applied to the spine in the same plane, they have no advantage over one another. Here, however, the situation was different. As seen in Fig. 22, the line of action of the left ribs (force applied to spine) were now all anterior to the line of action of the right ribs. In addition the left ribs were almost straight. Thus all the deformed left ribs made a "straight thrust" against the spine, the right ribs an oblique thrust.

In attempting to counter-rotate each element further, to correct the torsion, to change the shape of each element, the effort to rotate the spine in direction of *y* met rib *z*, greater than *y;* for *y* was limited to the extent the patient could stand pressure and pain. (See Fig. 22.)

The rib being unyielding, the result desired could not be accomplished until *z* was weakened. This could not be done until *z* was severed somewhere, probably close to the spine. Upon this principle depended the only possible hope.



The same story is told by photographs taken at the end of seven months' exercises. (See Fig. 23.) She is standing in the best posture she can assume. The head is held straight. The spine is straight from first cervical to the fourth dorsal, shoulders on a level, the left hip not very prominent, the contour of the left side more natural, the lumbar curve flatter, the spine less curved from the fourth dorsal to sacrum, the trunk vertically above the hips. The improvement above the fourth dorsal is permanent, for there was no bone deformity: below, except the increased flexibility, there is no permanent improvement. The improvement is postural entirely, due to a better relation of the elements to one another having been produced by the exercises (stretching contracted ligaments and toning up the muscles). When the picture was taken, she was in a state of muscular tension to hold the posture. *Fig.* 19 *is a photograph taken two minutes after Fig.* 23. See how the body has twisted to the right under the influence of obliquely acting body-weight until it came to a position of rest. The exercises toned up the muscles, increased their power, produced co-ordination, but no human being can or will stand, walk, or sit in a state of muscular strain. A position cannot be held which requires a constant muscle contraction for its assumption. The improved posture in this case could be lost in a few minutes, and was, as shown in the photographs. Fig. 23 represents what would be the posture for a few minutes. Fig. 19 would be the posture the remainder of the day, so long as she sat or stood up. *The bone deformity of each element was still present,* the deforming forces still acting as strongly as before. Fig. 3 was

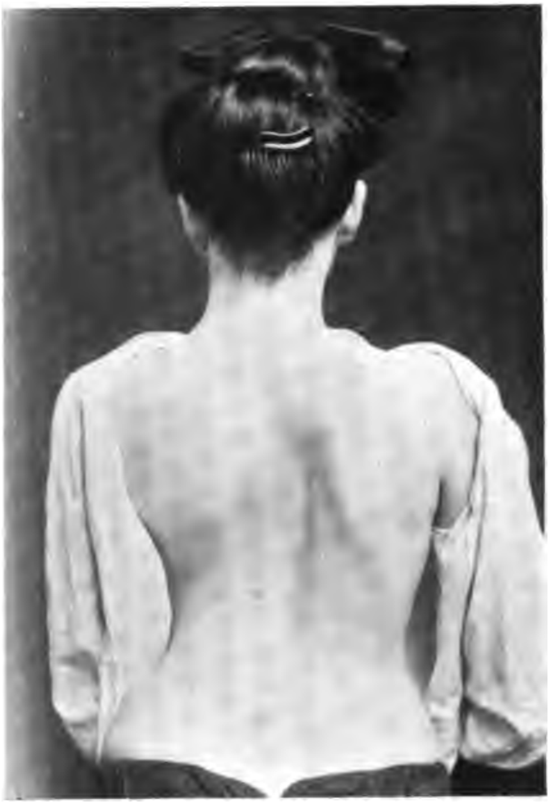


FIG. 23.

taken a few minutes after Fig. 23. The body must twist to the right.

The depression in the back to the left of the chest in front and below the left scapula (normally, a prominence making the shoulder glide forward), and the buckling backward of the ribs to the right of the spine in front of and below the right scapula (normally not so prominent and equal in elevation to the same area on the left, making the right arm glide forward), meant that in this case the left extremity must glide backward, and the right extremity forward, and the weight of these two extremities (a good part of the superincumbent weight) must of necessity act in an oblique manner upon the spine, and, as long as they acted thus, must they keep active a twisting force. This must continue until the shapes, curves of the ribs in question, be restored to something like the normal. Nor could the head be balanced in position until the body beneath should be better balanced. The weight of each thoracic element must, too, be eccentric with reference to the spine (from the shapes of them). Each element would twist upon the spine to the right. Thus the whole thorax would twist.

The question at once came up, Why not put the patient in some form of removable jacket, so that exercises could be taken, and preserve the upright position? That would have been done; *but, unless the shoulders were put* in the jacket, the position could not be held. When a jacket was put on up to the arm pits, the left shoulder would slide backwards over it, the right shoulder forward, the prominence of the ribs on right side behind appeared increased by the thickness of the plaster. In other words, though not so badly twisted with apparatus as without it, the patient, even with apparatus on, presented a badly *deformed appearance.*

The problem resolved itself into this: Each element, from the fifth inclusive down, instead of being symmetrical, as in Fig. 20, was now deformed into Fig. 21. Then each element from the fifth inclusive down must be changed into Fig. 20, or as near it as possible by some means. This could not be done by plaster: therefore, an operation must be devised.

In planning an operative procedure at this time, two things were dominant: first, to cut the ribs on the left side; second, to cut them without puncturing the pleura. The first could be done, and the second avoided, if the ribs could be successfully shelled out of their periosteal covering at the site at which it was desirable to cut them.

Six dogs were operated upon. The results of these operations demonstrated that in operating upon dogs the following things were true:—

First, after the skeleton of the dog's back had been exposed by incising skin and muscles, it was possible to shell a number of ribs out of their periosteum and to divide them each in several places, if so desired.

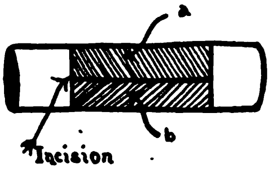


FIG. 24.

Second, that the periosteum (pleura) on the inner face of the ribs is not so adherent to the ribs as on the outer face (a fortunate circumstance); that the pleural periosteum was attached firmly only to the lips of the borders of the ribs.

Third, there was much danger of puncturing the pleura.

Fourth, the pleura was punctured several times, air was sucked in. The inrushing air was stopped by folding a piece of tissue over the place, and stitching back the periosteum over the rib.

Fifth, where there was much air sucked in through the punctured pleura, the respiration became labored.

Sixth, the hemorrhage from the periosteum and rib amounted to nothing, not more than one or two clamps being required in several rib sections.

Seventh, the best incision through the periosteum is an H-shaped incision—see Fig. 24—rather than only a longitudinal one, for the reason that, when the shaded areas *a* and *b* were reflected back, the remaining periosteal attachment on the outer surface of the rib offered no resistance to stripping the inner face of the rib: whereas in the longitudinal incision troublesome resistance was offered.

Eighth, there is no danger of injuring the intercostal arteries and nerves: they are reflected out of the way as the periosteum is detached.

Ninth, evidently no pain follows the operation other than to be expected from any wound. The dogs breathe quietly and naturally.

One dog died the night of the operation. It was not ascertained why he died. There was no hemorrhage at the operation, nor was his pleura punctured. Unfortunately, his body was immediately thrown out by the janitor before an autopsy could be made.

Notes of Operation Done on the Cadaver.

An incision was made through the skin fat and fascia from a point a little to the left of the spine of the fourth dorsal vertebra downwards and outwards to a point a little below and external to the lower angle of the left scapula. A second incision was begun at the lower angle of the scapula, and carried towards the spine of the second lumbar vertebra. A small triangular area just below and internal to the lower angle of the scapula, bordered below by the upper edge of the latissimus dorsi, above by the lower fibres of the trapezius, and externally by the last inch or inch and a half of the posterior border of the scapula, was sought as soon as the skin incisions were made. By going through a thin plane of fascia here, the thoracic wall was exposed to view. It is the only area on the back not covered by muscle. Then by blunt dissection, using the fingers, it was very easy to lift up the trapezius and latissimus dorsi muscles from the thoracic wall, exposing the ribs covered only by loose areolar tissue. By retracting these muscles, without cutting them, the fifth, sixth, seventh, eighth, and ninth left ribs were accessible for operation from the angle of the ribs to the attachments of the serratus magnus.

To expose the entire side from the fourth rib down to the twelfth, it was necessary to cut the trapezius across its fibres for about two inches and the latissimus dorsi for about five inches. With this incision the entire left half of the back and the side of the thorax were easily accessible. The hand could be passed up into the axilla, and by retracting the shoulder outwards and forwards the ribs beneath the scapula were accessible for operation.

The rib from its angle to the head could not be operated upon. The tendinous fibres which attach the deep back muscles to the ribs plunge into the rib. These fibres could not be stripped off. There was no detachable periosteal membrane, such as covers the other bony part of the rib. The part of the ribs that could be operated upon extended from the angle to the attachment of the serratus magnus.

The knife was laid aside after the ribs were exposed to view. At a selected site the |—| shaped incision was made with the writer's periosteal elevator No. 1 (see Fig. 25) through the periosteum. With elevator No. 2 (see Fig. 25) the flaps *a* and *b* were rapidly stripped off the outer surface of the rib to its borders.

Though rapid work may be done from this point on, it was necessary to use the most extreme care. With elevators No. 3 (right and left) the periosteum was stripped off the upper and lower borders of the rib to the inner lip. The operator must cling close to the bone with the edge of the instrument, scraping the bone. In this way puncturing the pleura was avoided.

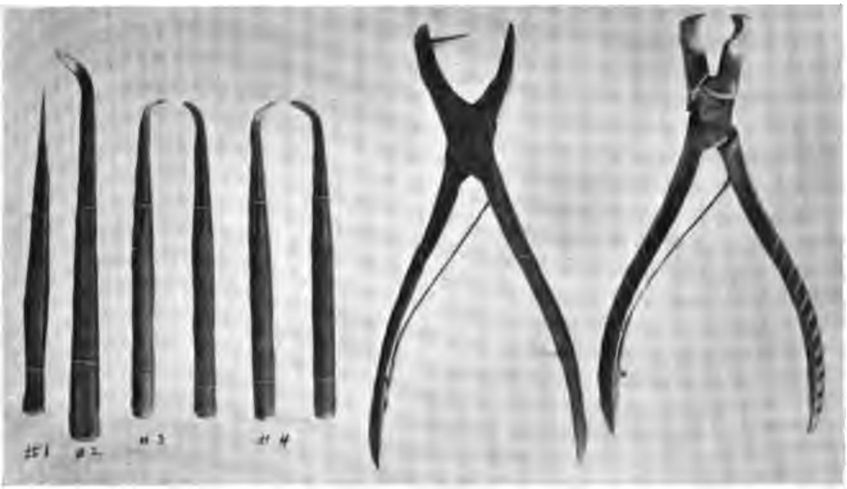


FIG. 25.

Elevators No. 4 (left and right), with longer shanks than No. 3, were used to strip the inner face of the rib of the pleural periosteum. The pleura and periosteum are here the same thin tissue: one can see through it.

The periosteum was attached to the inner lip of the upper and lower borders. Between these lines, or the inner face, it lay in close contact with the rib, but was not attached, as the periosteum is, on the outer surface of the rib and at the borders. It would seem that nature had prepared the way for this operation: for, if the pleural periosteum were as firmly adherent as the outer periosteum, it would be practically impossible to do the operation on account of the time it would take to safely shell out the ribs.

After the section of rib had been shelled out, the operator could do as he wished with the cleaned bone without entering the pleural cavity.

The intercostal blood vessels and nerves were not injured in the periosteal dissection. The instrument was always between them and the bone of the rib. The periosteum could be stitched over the rib, if so desired.

Instruments for the Periosteal Dissection.—A number of instruments were designed and then discarded. Finally, the ones shown in Fig. 25 were designed, and proved to be perfectly satisfactory. Indeed, it would be impossible to do the periosteal dissection with facility without them.

The handle of each, except No. 2, is a little bigger in diameter than a pencil. In using them, they are held in the hand just as one holds a pencil in writing. Thus one obtains the advantage of the hand's best tactile judgment in stripping the rib where this procedure is most difficult.

No. 1 has a cutting edge, rounded and sharp. It is used to make the incision through the periosteum. Its advantage over a knife is that it has no point and is much heavier. Its weight necessitates less pressure to be made in making the periosteal incision, thereby decreasing the danger of the instrument slipping and cutting into the lung cavity.

No. 2 through its curved beak enables one to apply the power of stripping effort directly upon the bone. Here, again, the danger of slipping is practically obviated. The beak is one-half inch wide, so that it takes only very few strokes to bare the outer surface of the rib.

No. 3 (right and left) are shaped like golf sticks. They are used to strip the periosteum from the borders of the ribs. The curve of the shank is such that without changing the posture of the operator's hand the instrument glides over the borders of the rib.

No. 4 (right and left) have longer shanks than No. 3, and are used like No. 3, only, by virtue of their long shanks, one is enabled to strip the inner face of the rib easily.

In using Nos. 3 and 4, they are handled as one uses a pencil in making an up and down stroke, moving the fingers chiefly, the wrist a little. Note the thickness of the shank and its bevelled character. By hugging the bone with the scraping edge, this thick bevelled shank depresses the membrane from the bone, decreasing the danger of cutting through.

No. 5 is a rib punch with which one can punch a hole in fragments if it be desired to wire them.

No. 6 is an extremely useful costotome. The cutting part of the instrument is at right angles to the handle.

December 3 the patient returned to undergo the first operation. Her condition was good.

Fig. 23 shows the best position she could hold for a minute or two, by much tension. This position she could not hold longer. Fig. 19 shows the body shape as she stood naturally, as she walked. In a jacket the deformity was still just as distressing in appearance. Fig. 3 shows the patient bending forward, the bone deformity of the thorax still present. These photographs were taken within a few minutes of each other. They show that no result but flexibility had been obtained, that the structural deformity of the chest, as above explained in detail, forced the trunk from its weight to twist to the right.

First Operation, Dec. 6, 1902.—Usual preparation for operation. Ether. Rubber gloves worn by operator and assistants. Patient lay on her stomach. Beginning at the spine of the fifth vertebra, the incision extended downwards and outwards to a point a little below and external to the inferior angle of the scapula. The second incision extended from the scapular angle towards the twelfth dorsal vertebra. The triangular area was exposed; with the fingers the latissimus dorsi and trapezius were separated. Long clamps were applied to the trapezius perpendicular to the direction of its lower fibres. The trapezius was divided between these clamps for two inches. The rhomboideus major was coextensively cut. By retracting the skin and muscles and holding the upper extremity forwards and outwards the skeleton of the thorax was exposed, the ribs glistening beneath a thin layer of areolar tissue. The fifth, sixth, seventh, and eighth ribs were selected for operation, because, these being rotated forward, the most of their normal curve having been straightened more than the others, they corresponded to the deepest sunken area in front of and just below the tip of the shoulder blade; because, as long as that area was sunken in, the plane of the chest wall would be such that the left shoulder must glide backwards towards the spine; and because the position of these ribs and their attachment to the spine opposed structurally the counter-rotation efforts. If the sunken area were filled in, then the shoulder must glide forwards and its weight would be properly applied to the spine, and that much obliquely applied superincumbent weight overcome: if the area were filled in, each element so operated upon would be nearer the symmetrical shape, and the weight of such element operated upon would fall less obliquely upon the spine. If by the operation the line of action of force z were changed to z' (Fig. 22), then the forces of the elements (ribs) ap-

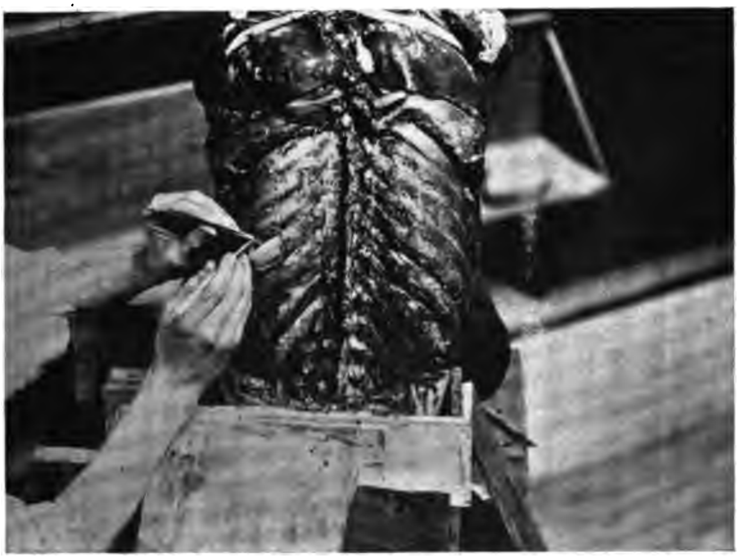


FIG. Z.

plied to the spine would be more nearly in equilibrium, rib resistance to counter-rotation would be overcome, "rotation flexibility" would be produced. From these things the trunk would be better balanced.

The incision described above was made in the periosteum. The periosteum or the outer surface of the rib for one and a quarter inches was peeled off with elevator No. 2, as near the angle as possible.

Fig. Z shows on *cadaver* the method of stripping rib of its periosteum.

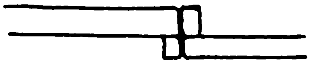


FIG. 26.

Elevator No. 1 was used to strip the inner surface of the rib. (In the dog operations these two instruments were used, and sufficed for the task. The first operation on the patient was done with these two periosteal instruments. One can imagine the discomfort the operator experienced when he found the ribs so crowded together that the blade of No. 1 could hardly be used on the inner face of the rib. It was extremely difficult to strip the ribs' inner surface with a straight instrument without cutting through the pleura with each stroke. But it was finally successfully accomplished.) There was very little bleeding, which stopped as soon as the periosteum was entirely loosened.

After the desired segment of each rib had been shelled out of its periosteum, strips of gauze were passed under the ribs. The ribs were then divided by bone forceps between the gauze strips. A small piece was cut off the fragments distal to the spine, as shown in Fig. 18. An assistant lifted the cut ends by traction on the gauze strips, preventing possible tearing of the pleura by the cut ends moving with the respiratory effort. Notches were cut into the upper and lower borders of each fragment. (See Fig. 26.)

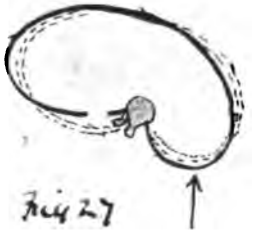


Fig 27

An assistant then made counter-rotation pressure upont he prominence on the right of the spine. The distal fragment was lapped over the fragment nearest the spine. The ends were wired with silver wire catching in the notches. By this rotation and overlapping of the rib fragments the change in each element was as seen in Fig. 27.

Examine the photograph (Fig. 32) to see the actual change.

After the fragments were wired, the periosteum of three segments was stitched back with fine silk. The periosteum of the fourth segments could not be stitched, owing to retraction and contraction of the intercostal muscles.

Two mattress sutures of silk were used to reunite the divided portion of the trapezius. Three vessels were tied in the operation. The skin was sewed up with a subcutaneous stitch. Patient was put in a plaster jacket.

It took three hours and thirty minutes to do the operation, from the moment she was placed on the table until she was taken off.

There was a good deal of shock. This shock was produced by several things: prolonged anæsthesia, lying on the belly, and the forceful effort to counter-rotate the spine after the ribs had been cut, and the patient's lack of reserve heart power.

As soon as the patient was put to bed, lying on her back, she rallied, and was soon in good condition.

Notes from Bedside Chart.

First Day.—Badly nauseated, vomiting, pain in abdomen; highest temperature, pulse, and respiration, 99½, 136, 50.

Second Day.—Badly nauseated, suffered much from abdominal pain; highest temperature, pulse, and respiration, 100, 134, 34.

Third Day.—Nauseated, nervous; highest temperature, pulse, and respiration, 100, 118, 26.

Fourth Day —Some nausea and vomiting, better, quiet; highest temperature, pulse, and respiration, 100⅗, 120, 20. Menstruating.

Fifth Day.—Pain in stomach; highest temperature, pulse, and respiration, 99¾, 108, 20. Nervous.

Sixth Day.—Menstruation ceasing, slept well, comfortable; highest temperature, pulse, and respiration, 100, 110, 18.

Seventh Day.—Pulse, 87; temperature, 99; respiration, 18. After the seventh there was no discomfort. At no time was there any indication of pleural friction.

Fourteenth Day.—Stitches in skin were removed. Healing perfect. In the photograph the scar appears wide: as it stretched. In the fourth week the jacket was changed and the patient was allowed to go home.

Jan. 29, 1903.—Returned to-day for jacket. The area operated upon is more filled in, exactly how much it is impossible to know. The left shoulder does not slide backward so easily as it did before the operation. There is not such a great tendency for the body to rotate to right. There is no change in the right side that one can estimate with the eye. The body seems better balanced. The curve of the spine in the mid-dorsal region (as shown by spines of vertebræ) is increased, as would be expected from the mechanics of counter-rotation. Sent home in a jacket.

Feb. 15, 1903.—Patient returned to-day for second operation. In the first operations, difficulties were encountered which would make the repetition of that procedure not advisable. The time consumed was too long, there was too much shock. Could another means be devised to shorten time and facilitate the operation?

The other periosteal instruments, Nos. 3 and 4 (right and left), were, after having tried and discarded many models, found to make the stripping of the periosteum easy after practice, so that the danger of going through the pleura was minimized and the dependent slowness of the procedure done away with.

Fig. 28 shows a section of a lamb's thorax with the ribs intact: they are stiff and unyielding. Fig. 29 shows the same with ribs operated upon in three places. At each site the rib was not quite severed, all but the inner shell having been removed.

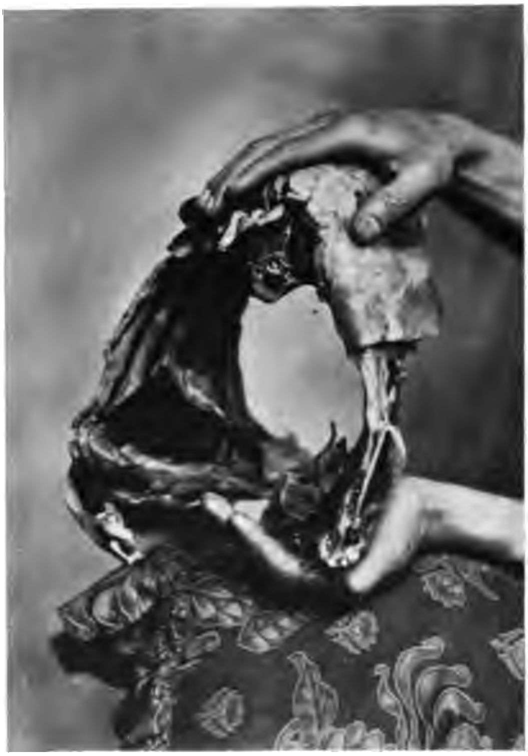


FIG. 28.

Fig. 30 shows the flexibility of the same side after the operation had been performed.

The degree of flexibility after the operation in animal subjects varied with the toughness of the ribs and the thickness of the shell left. It must vary in the human thorax, and in different parts of the same thorax.

The rational thing at this second operation would have been to operate upon the ribs of the left side, which were not touched in the first operation, left untouched at that operation because the writer did not feel like exposing the patient longer.

But it was feared the patient might not consent to the third operation, which it was seen at this time would be necessary. The hump on the right side of the spine was still present, and projected more with a jacket on than without a jacket. If she should not fail in courage, he hoped to leave her with much of this hump diminished in size. Therefore, he determined to operate upon the right ribs at the second operation.

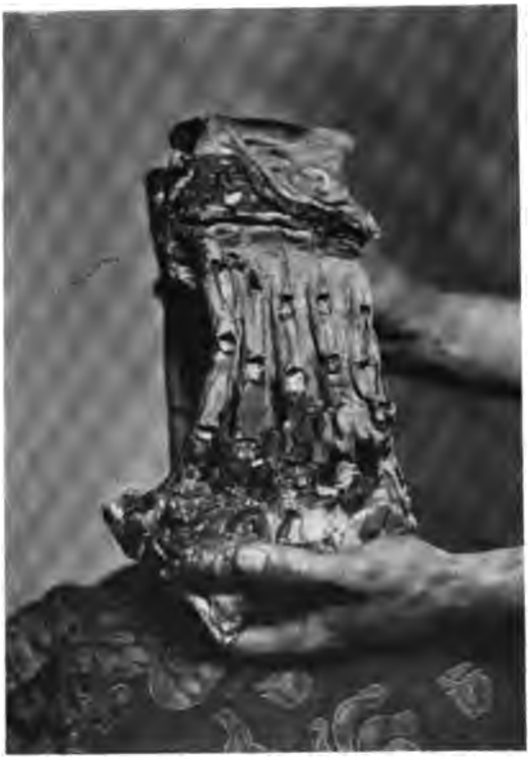


FIG. 29.

Feb. 20, 1903.—Second operation. Ether. Patient lay on left side. Gloves worn by operator, assistants, and nurses.

It was planned to make two rib sections, as shown in Fig. X from each rib from the fifth to the tenth inclusive, along the lines shown in Fig. 18. The incision made is shown in Fig. 31. The same procedure was done to expose the ribs as was done on the *cadaver* and at the first operation, only the second incision was longer, and a part of the latissimus dorsi was divided across its fibres, as well as a part of the trapezius

Twelve rib sections were made. The average length of time for each section (stripping the periosteum and cutting one section of the rib, leaving the inner table) was three minutes and ten seconds. The periosteum was not stitched back over the gap. The cut in the trapezius was 1½ inches long only. The position while operating under the shoulder blade was cramped. The latissimus dorsi was cut across its fibres five inches. The incisions in the trapezius and latissimus dorsi were reunited by mattress sutures. Subcutaneous skin suture was used.

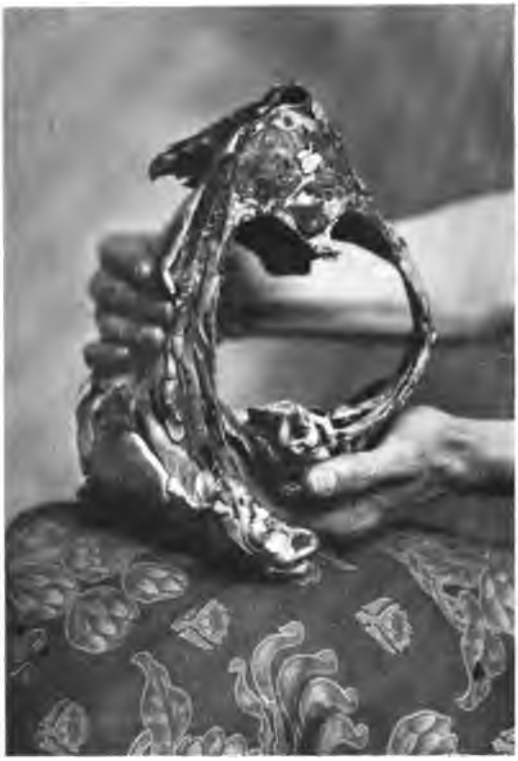
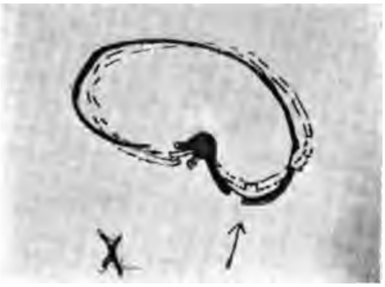


FIG. 30.

Prior to the operation a cast of the back was taken, as the patient bent forward. The hump to the right of the spine was carved from the plaster reproduction of the back made from the cast, and the depression to the left was filled in with plaster. Then a plaster cast of this carved reproduction, of the back only, was made. When the operation was finished, while still under ether, the patient was laid back down in this cast, and strapped to it. A fracture of a number of the ribs was produced. A plaster jacket was applied to the patient lying in this splint, including the splint.



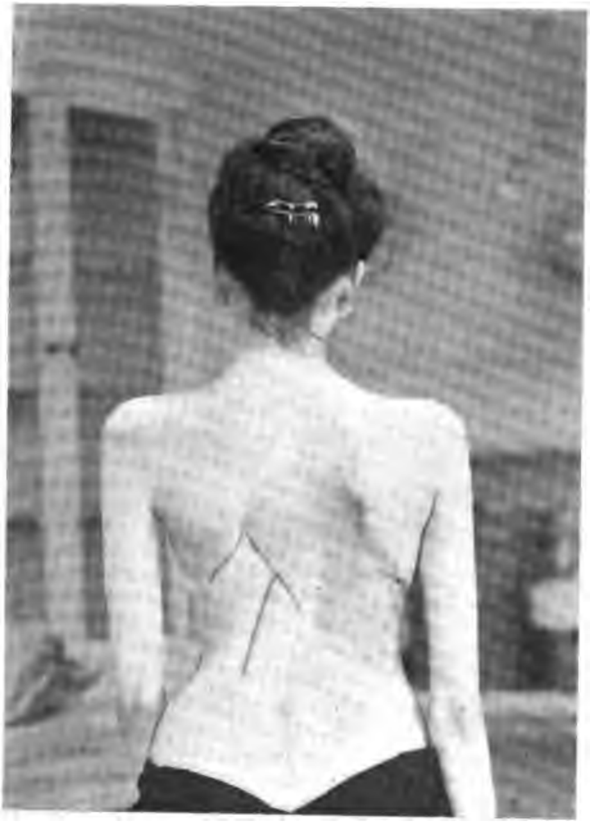


FIG. 31.

Two hours and three minutes elapsed from the moment the incision was begun until the sewing was finished.

Thirteen minutes were consumed in putting on the jacket. The pleura was not punctured at all. There was no shock, no embarrassed respiration at any time during the operation. The operation was performed in a space of time which could not be regarded as objectionable, and as many ribs were operated upon as will ever need attention in any case. This demonstrated that the procedure could be done successfully without danger to the patient and in a reasonable length of time.

Fig. X shows the mechanics of what was done to each element, and how pressure upon the prominence after the elements had been operated upon would change the shape of each element, the idea being to change the shape by the operation, then to hold the patient in a jacket until new bone should fill in the gap in ribs, thus producing finally a more symmetrical and a solid set of elements. The attempt, one sees, was to flatten the prominence beneath the right shoulder, to change the plane of the thorax at that point, so that the right shoulder would glide backwards instead of forward, and thus make the two shoulder blades level.

An examination of Fig. 32 shows that the fifth and sixth ribs did not fracture. Notice how prominent they are, and that from that prominence (dotted line at the foot of it) the hump has been symmetrically reduced to the twelfth rib. With reference to reducing the hump in the fifth and sixth ribs close to the spine the operation was a failure. But, even with partial change in the fifth and sixth elements, the change produced in the other elements balanced the body better and the right shoulder was easier to hold back, though the tendency for it to glide forward was not entirely overcome. *An effort to counter-rotate was still resisted by the ribs on the left side, untouched at the first operation.* The patient's back was excoriated by the pressure of the plaster. This produced discomfort. Otherwise there was nothing worthy of note in the convalescing period. No such degree of flexibility produced by operating upon the lamb's ribs was obtained here, for the reason that in this patient the outer shell of bone beneath the periosteum was much thicker, and therefore more resistant. Evidently, the operator's desires could not be partly trusted to pressure after the skin incision is sewed. Whatever might be desired must be done completely with the costotome while down upon the ribs. The fractures should have been made complete where they were wanted.

June 23, 1903.—Patient returned for the third operation. Her general condition was good. This operation was performed on the 26th of last June.

Ether. Gloves. Patient lying on right side. At this operation the technique in getting to the ribs and in shelling them out was the same as in the second operation: hence it is unnecessary to go into details. In this third operation the twelfth rib was fractured during the operation by the fingers after the section of rib had been cut out in one place, the eleventh in two places, the tenth in three places, the ninth in three places, the eighth in three places, the seventh in two places. (The sites operated upon on the seventh and eighth were external to the section made in the first operation.) These fractures were incomplete, "green stick," except at one place on the eighth rib and one place on the tenth. The pleura was punctured once in this operation, the only time in the three operations that this was done. A little air sucked in,—very little,—the suction of air stopped by folding tissue over the rib and stitching it there. It took one hour and forty minutes to do the operation from the first stroke of the knife to finishing the dressing. The day before the operation the pins of the author's apparatus, used in applying the jackets, were set in just the position desired, so that the proper pressure could be made. As soon as the operation was finished, the patient was transferred to the apparatus. The bandages had been put in water a few minutes before and were ready for use. The application of the jacket took fifteen minutes. There was no shock.

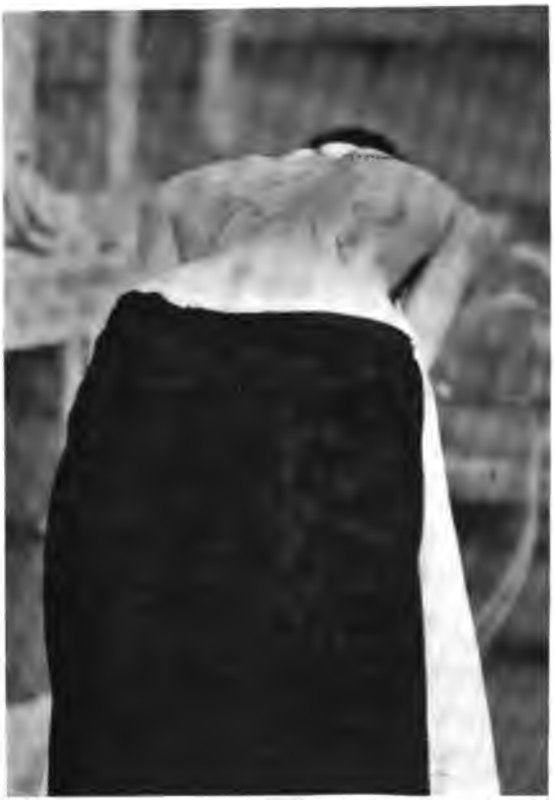


FIG. 32.

Note, July 6.—Ten days since operation. To-day first dressing was made. Union is perfect. Stitches removed. Depression in back much filled out. Patient can move herself somewhat without pain. Condition perfect. Looks better than before she went into the operation. She has had no pain since the operation except a little belly-ache. The highest temperature was 99⅘; highest pulse, 126. Temperature was normal after the third day. After the dressing was made, the patient was put in the special apparatus and a jacket applied without use of ether. Ether was not used at any time except when an operation was performed. *It is perfectly easy to rotate the chest in any direction with the hands.* Fig. 34 shows the apparatus for application of the jacket, the patient having been left on the frame long enough to make a photograph. The writer has called this his apparatus for lack of another term of identification. The principles are the same as formerly in use, but the details of construction are different. A jacket can be applied with the patient lying on her face or on a hammock stretched on the gas-pipe frame, the adjustable steel arches can be placed above and below, or the patient can be placed on her back, her hips and shoulders resting on padded boards, as shown in the illustration. The pins, large screws, may be slid along the steel arches to any position desired. The screws, since they revolve in a vertical plane, can be placed so that pressure may be made *upon any part of any element at any angle desired.* In the illustration a padded steel piece an inch wide, and long enough to extend across several ribs, was placed beneath the angles of the right ribs; and the two pins below press upwards at points a half-inch from the ends of the board. In this demonstration each element from the seventh down was subjected to the forces acting as shown in Fig 33.

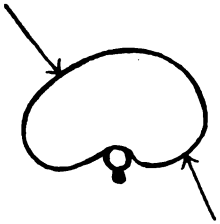


FIG. 33.

With the flexibility produced by the last operation it was possible to put the patient in this apparatus in such a position that the back was flat and the front part of the chest perfectly symmetrical.

In a normal thorax the spine is straight, each element is a symmetrical figure, and each element is balanced upon the spine. Thus the whole thorax in a normally developed person is constructed so as to be balanced. Note that the muscles of the trunk are arranged to control the movements of a balanced figure. Were the elements joined behind as they are in front, there would be no flexibility. The ligaments, spinal and costo-spinal, prominently the anterior costo-transverse ligament, the tendinous attachments of the deep muscles from rib to rib, and transverse process to transverse process preserve the poise of the body within the limits of motion possible. The body cannot bend further than the ribs permit. Within this limit the ligaments may limit the motion. The muscles execute the motion. The relaxation of a set of muscles can throw the spine out of balance. Thus undue tension is put on the ligaments of the same side. Ligaments stretch from constantly bearing strain. The constant contraction of a muscle or group of muscles and the relaxation of the group of the opposite side cannot carry the body in a certain direction *further than the ribs* will permit. If the body bends beyond the natural limit, the ribs bend.

The chain of causes here and in all lateral curvature cases not caused by disease must be this: a group of muscles tires easily, the weight falls obliquely on the spine, rotation and lateral bending of the spine begins, the ligaments stretch, continued obliquely acting weight causes the spine to rotate further, the ribs to go forward and straighten on one side, to rotate backwards and bend backwards on the opposite side, so that finally one has to contend with weak muscles, contracted ligaments, fascia, and tendons on one side, the same stretched on the other side, and a deformed thorax, as above,—the expression of the sum of the deformities in the elements composing it. Thus contracted ligaments and soft tissue on one side of the spine form one group of conditions to be treated, the same structures stretched on the other side a second group of conditions to be treated, the weak muscles a third condition, and, last and most difficult, the deformity of each bony element, as described above.

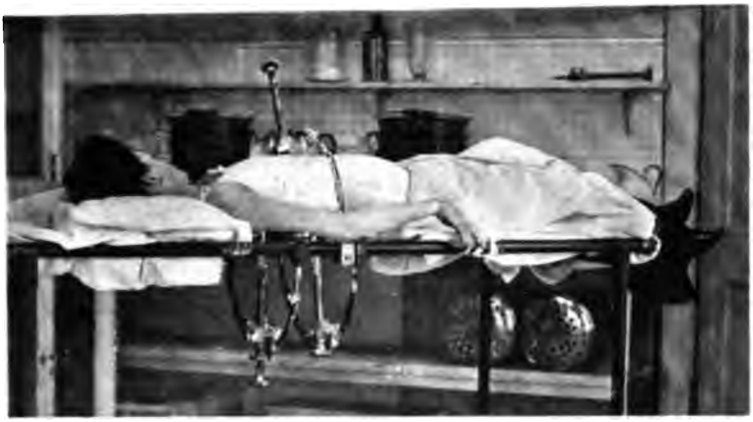


FIG. 34.

Exercises as a means of developing muscle, to stretch ligaments, to build up the constitution, to produce a poise sense, are most valuable. Nothing else can take their place for these purposes. With jackets one may, if the thorax is put under the proper pressure conditions, obtain correction of bone deformity if the ribs are very flexible and the ligaments not contracted, the correction being trifling or considerable, depending upon how soft the bones may be and how relaxed the ligaments may be.

Hitherto, since no other means was available, exercises and jackets have been applied to cases where they could have no influence upon the bony structure.

In a case with osseous deformity, even after the ligaments, etc., have been stretched and muscles developed, the flattened and anterior displaced ribs are obstructions to rotation *and counter-rotation* of the spine, hence obstructions to straightening the spine as well as being a part of the deformity of the elements.

This operation makes it possible to change bone deformity that cannot be affected by plaster. It is thus to be used in the vast majority of cases,—the cases that are not simply postural.

The result in this case must be about as clear to those who examine the photographs as to the writer. The case was one of severest curve and osseous deformity. Thus the severest possible test to the surgical procedure has been tested in the first case so treated. The writer is frank to say that the best possible result has not been obtained in this instance. If he could go over this again, he would do to all the ribs in the left side from the fourth inclusive down in one operation as was done to the ribs operated upon in the third operation. He would then, when the patient was in proper condition, operate upon the right side after the same manner done in the second operation, only he would do more and not depend upon the pressure of the jacket (put on immediately after the wound was sewed up) to produce the rib fractures. The above case is the only one ready for this semi-final report.

In Fig. 2 the bad deformity is partly postural and partly structural. In Fig. 23 the postural element (dependent upon contracted ligaments and muscles on the left side, and stretched ligaments and lax muscles on the right side) is gone, but the patient could not hold that improvement. (See Fig. 19, taken two minutes later.) Nor could the writer hold it for her without keeping her in plaster, including the shoulders,—a horrible possibility to a woman; and, even with such a jacket on, the projection of the hump would have been exaggerated by the thickness of the plaster. The hump and the flattening were still there. (See Fig. 3.)

Fig. 31 shows her upright posture August, 1903, after the three operations. The photographs were taken after she had been standing about ten minutes. The difference had been produced by changing the shapes of the elements, balancing the thorax better by this change. Fig. 32 shows the patient bending forward after the three operations. Contrast Fig. 3 with Fig. 32.

The spine is not straight in the upright posture, but it is straighter and the body outline is far more symmetrical. The posture of the upper extremities is vastly nearer the normal, and to a corresponding extent is the deforming force of their obliquely acting weights incident to their former positions corrected. When the patient lies prone, the spine is straight.

When standing with a light jacket on, very little deformity is perceptible. *The body is very flexible now.* Since the body is so flexible, she will be improved more by jackets put on, with the thorax under the proper pressure conditions.

Since the result is not perfect, she would relapse to a certain extent without a jacket. The writer does not know how far she would relapse without a jacket. It would be interesting, but not fair, to find out. The writer does not believe it is possible for one to make such a deformed thorax perfectly symmetrical again.

The field for the operation's best usefulness must be with the great majority of cases in which a bad figure is dependent upon the deformity of a fewer number of elements than were deformed in this case.

Correction jackets will be worn by the patient, changed once a month, for a while. Then a light removable jacket will be worn, so the patient may exercise (simple extension exercises) daily.

In the examination of lateral curvature cases with osseous deformity one will always find the ribs flat on one side and prominent on the other. The broad mechanical principles of this case are operative in all osseously deformed cases, but there must be an infinitely varied detail, for the curve of the ribs and their angles of inclination to the spine mean, if abnormal, the application of deforming forces to the column and thorax. If one operates, he does so not for disease, but to correct faulty mechanics and deformed anatomy. Thus, given a patient who is in physical condition for the operation, the result must depend upon the operator's interpretation of the forces with which he is contending and the accuracy with which his remedial procedure is executed.

To the writer it seems fair to state that in the future lateral curvature with osseous deformity must be treated as follows:—

(1) Exercises must be taken, in order to do away with all contraction of ligaments, fascia, and muscular resistance to flexibility, and to build up the general health. The writer thinks that all the movements of the trunk must be executed in the exercises, regardless of the influence of such exercises upon the rotation of the vertebræ, flexibility being the sole object.

(2) The flattened side of the back must be operated upon so that side forces (ribs) applied to the spine may be so weakened and the ribs made so flexible that the plane of the thorax beneath the shoulder may be changed to as near the normal as possible, the flat ribs recurved towards the normal, and the resistance to rotation reduced or destroyed.

(3) Then a series of jackets must be applied, using the prominent side as a point at which to apply pressure to obtain counter-rotation. These jackets are to be applied until the bone-union in the ribs is perfectly firm.

(4) The curves in the ribs on the prominent side must by operation be restored to as near the normal as possible, in order to do away with the prominence and to restore the natural plane of the thorax beneath the shoulder. The accomplishment of 2 and 3 better balances the thorax.

(5) A series of corrective jackets must be applied until the bone-union in the ribs is firm and all the correction possible obtained.

(6) A removable jacket and daily exercises. How long this jacket should be worn must depend upon the case.

At some time in the future the writer will make another report upon the condition of the patient at the time of such report.

It is not often that one witnesses the cheerful courage this young lady showed in submitting to an untried operation which in this, the first instance, seemed to the writer full of possible difficulties. Hence, in writing the account of this case, it does not seem malapropos to mention one's appreciation of a high courage which expressed itself in a resignation to and confidence in the operator's plans.*

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* "Operative interference by resection of the ribs has been performed twice by Hoffa on patients, and is said by him to have been suggested by Volkmann in 1899, but not performed by him on the living patient" (*Zeitschr. für orth. Chir.*, 1896, p. 401).

Shaffer advocates a new operation for the cure of rotary lateral curvature which he had performed on the *cadaver*. *American Medico-Surgical Bulletin*, Jan. 1, 1894, p. 51, and Feb. 15, 1894, p. 236.

ABSTRACTS.

SCOLIOSIS.

73. Zuppinger's Scoliosis Theory. *Zeitschr. für orth. Chir.*, xi. 280.

H. Zuppinger's theory is that pressure against the side of the thorax anteriorly will produce a scoliosis, and finally also a twisting of the vertebræ. He bases his theory upon a large number of observations and measurements of normal and abnormal thoraces. He reports the case of a girl who a year before was not scoliotic, but who has since then worked with her right hand extended, at the same time leaning against a horizontal iron bar. She now presents a distinct costal hump anteriorly on the left side, posteriorly on the right side; the sternum deviates toward the left; the dorsal spine is convex toward the right, the lumbar spine toward the left side. Treatment based upon his theory produced a marked change in ten weeks.—*H. A. Wilson, Am. Med.*

74. Pathogenesis of the Scoliosis of Childhood. *Zeitschr. für orth. Chir.*, xi. 383.

Mechanical theories may explain some of the cases of scoliosis, but no one theory can explain all of them. The fundamental condition must be sought for in a disease of the vertebral column. C. Deutschländer points to v. Recklingshausen's description of infantile osteomalacia. It is not a rachitic process, but one of softening and melting away, due to congestion of the blood vessels. Anomalous blood-vessel walls and mechanical irritation due to increasing pressure are the predisposing factors. The process once begun will continue itself, due to the decreasing ability of the spinal column to support the weight of the body. Coexisting deformities, as flat foot, genu valgum, etc., are a further expression of the disease.—*H. A. Wilson, Am. Med.*

75. The Mechanics of Lateral Curvature as Applied to the Treatment of Severe Cases. By R. W. Lovett. Translated into German with a "Nachschrift" by W. Schulthess. *Zeitschr. für orth. Chir.*, Bd. XI. Heft 4, 1903, pp. 827–855.

In his "Nachschrift" Schulthess urges the importance of Lovett's studies, but emphasizes the danger of inferring corrective results from posture in scoliotic cases based on studies of behavior of normal spines.—*G. W. Fitz, Boston.*

SPINE.

76. The Localization of Osteomyelitis in the Lateral Parts of the Sacrum and its Relation to Growth. By Gross. *Deutsch. Zeit. für Chir.*, lxviii. 95.

G. reports six cases of this unusual affection. Points out its exclusive localization in the lateral parts of the bone. Shows anatomical preparations to prove that the growth of the sacrum takes place principally in the lateral parts of the three upper segments. Attempts to show a causal relation between this and the occurrence of the infection in this place. Involvement of the spinal canal was observed in only three of the cases found in the literature. Trauma is not considered important in the etiology. The mortality of the disease is great. Two forms, light and severe, are distinguished.

The frequent occurrence of pelvic abscesses makes the prognosis grave in all cases, however. The albuminous form of the disease has been observed. *A. H. Freiberg, Cincinnati.*

77. Affections of the Cauda Equina in Consequence of Tuberculosis of Adjoining Bones. By M. Bartels. *Mitteilungen a. d. Grenzgebieten der Med. u. Chir.*, xl. 1617, Jena.

He reviews two cases personally observed and one other. If the tuberculosis develops secondarily to a tuberculosis of the sacro-iliac synchondrosis and the adjoining bones, the nerve symptoms usually locate it. He considers surgical measures justified when the vertebræ are not affected and the symptoms indicate compression by the upper part of the sacrum. When only the lower part of the sacrum is involved, he thinks little is to be gained by operation.—*Abst. Jour. Am. Med. Ass'n.*

78. Chronic Ankylosing Inflammation of the Spinal Column. *Zeit. f. klin. Med.*, xlix.

V. O. Sivén claims that under the name of spondylitis deformans are included several heterogeneous diseases. There are two main forms: in one the intervertebral cartilages are affected, and in the other the vertebral arches are the primary seats of disease. Four cases are reported belonging to the latter class. In all of them the small joints of the spinal column, together with their ligaments, were attacked by an inflammatory affection, which finally led to complete ossification and ankylosis of the joints. The disease process differs from ordinary arthritis deformans in being inflammatory in nature and in not being constitutional in character.—*Abst. Am. Med.*

79. Spinalgia as an Early Symptom of Tuberculous Infection. By J. Petruschky. *Mün. med. Woch.*, March 3, 1903.

J. Petruschky is of the opinion that tuberculosis of the bronchial glands always precedes pulmonary tuberculosis. He quotes several very striking instances of advanced glandular disease, associated with pulmonary lesions so slight as to be without symptoms, and advances a theory to show how the tubercle bacilli reach the glands primarily As a very early symptom of bronchial gland tuberculosis, he mentions spinalgia, "tenderness of definite vertebral spines to pressure." The following symptom-complex is usually present: 1. Several spinous processes are tender to touch, while the others are not at all: this tenderness increases with repetition of pressure. 2. The painful spines are usually somewhat depressed. 3. The processes are usually broader, softer, and more elastic. 4. They are usually included between the second and seventh dorsal vertebra. The tuberculin reaction is necessary to settle the diagnosis beyond a doubt. In 79 cases of spinalgia the tuberculin reaction was positive in 77 cases, and only 14 of these had tubercle bacilli in the sputum. In advanced cases the symptom is rarely present. It must not, however, be considered a pathognomic sign, but only a link in the chain of symptoms.—*Abst. Am. Med.*

80. Tuberculosis of the Spine. By J. E. Goldthwait. *B. M. & S. Jour.*, Sept. 24, 1903.

J. E. Goldthwait gives a statistical analysis of all the cases of tuberculosis of the spine which have appeared at the orthopedic department of the Carney Hospital during the eight years previous to 1902. No patients under twelve years of age were treated. In all there are 108 patients, of which 62 reported more or less regularly for treatment. Of this number (62) 41 were under thirty, and in 21 the disease had existed for from six to twenty years. In 20 cases there was abscess. Of this number 8 died and 4 are at present in poor condition. In 11 cases there was paraplegia, and of this number 2 died. Of the 62 patients, 11 died, and in nearly all, death was due to the extension of the disease locally or to some other part of the body, the average time between the onset of the disease and the time of death being four years. Attention is called to the fact that the cases studied were entirely hospital patients, living for the most part under poor hygienic conditions. A similar number of private cases studied would probably show more favorable results. *Abst. Am. Med.*

81. Further Observations on Cervical Dislocation. By G. L. Walton. *B. M. & S. Jour.*, cxlix. 17, 445.

Cervical dislocation is not a mere medical curiosity, but is likely to appear in the practice of any physician. Walton has seen at least sixteen cases. Traction is of no aid in reduction, in fact may hinder it by lessening the effectiveness of the necessary fulcrum. In 1899 Walton proposed dorso-lateral flexion and rotation. Two cases have been reduced by this method at the Massachusetts General Hospital since that time, one by Dr. Beach and one by Dr. Mixter (the latter a case of six months' standing). In the other cases coming to Walton's knowledge since his previous communications two spontaneous reductions took place during sleep and three during the etherization preparatory to operation. One of these cases resulted from turning the head suddenly in running round a corner, one from a football scrimmage, one was produced in brushing the hair with military brushes, one by a railroad accident, the rest by falls.

The *side* of dislocation may be always determined by the *rotation* of the head, the face being turned away from the side of the displaced vertebra. If the process has slipped down into the intervertebral notch, the head will be *bent* toward the injured side. If it has been caught at the crest of the process below, the head will be bent in the opposite direction.

For reduction the patient should always be etherized and placed in the sitting position. Suppose the left articular process is displaced, and the patient is facing north, the head must be first tilted south-east, rotated slightly with the face to the right, then rotated back to place.

BONES AND JOINTS.

82. Syphilitic Joint Inflammations. By Borchard. *Deutsch. Zeit. fur Chir.*, lxi. 110

Borchard divides luetic joint diseases into primary and secondary. The former may arise during the secondary or tertiary stage. In congenital syphilis we may have both, the latter following inflammation of the neighboring periosteum and bone. Either may be acute or chronic. The acute, characterized by hydrops and swelling, is nothing more than synovitis, due to syphilitic poison and associated with the general disease. It may occur as often as secondary symptoms arise. All the other joint inflammations are the expression of a local syphilitic product. The gumma may have its seat in the synovial tissue or the cartilage. Fringe formation cannot be traced to a chronic hydrops, but must be considered as miliary gummas of the synovial membrane. The acute hydrops cannot become chronic without formation of miliary gummas of fringes, and even joint inflammation in tertiary and congenital syphilis may be traced to this change in the synovial, parasynovial, or cartilaginous tissue.—*Abst. Am. Med.*

83. Scarlatinal Arthritis. By E. Palier. *Am. Med.*, July 18, 1903.

The author states that until recently joint affections occurring in scarlet fever have been considered of rheumatic origin, and anti-rheumatic treatment has been used. The rheumatic theory is given little credence now. Scarlatina now being considered to be of streptococcus origin, the joint affections are considered to be of the same origin. Ashby considers joint affections to occur in about 2 per cent. of cases of scarlet fever.

The joint affection is most frequent at the end of the second week and

before desquamation sets in, the severer types occurring where only one joint is affected. Little or no treatment is advised, with the exception of soothing ointments and rest. Salicylates often do harm. The author reports a case, a number of joints being affected.—*A. T. Legg, Boston.*

84. Pneumococcus Arthritis in Children. *Lancet*, Aug. 1, 1903.

Dunn and Robinson of the East London Hospital report five cases of acute joint infection in which the pneumococcus was demonstrated as the cause. The age varied from six months to six years. In four cases there seemed to be an antecedent cause, pneumonia, bronchitis, otitis media, and measles. In two cases the knee only was involved, in two there was a multiple joint infection, and in one case the hip joint was affected. In all of the cases there was severe joint disorganization, although the cases were all operated upon early and thoroughly drained.

Three cases died. Autopsies showed no original focus in the lungs. In one case a pure culture of pneumococcus was obtained from the heart. The writers conclude that the pneumococcus plays a much more important part in the diseases of children, and especially in the joint diseases than is generally supposed.—*H. W. Jones, St. Louis.*

85. Arthritis accompanying Gonorrheal Conjunctivitis in the New-born. *British Med. Jour.*, 1885, i. 429; ii. 57, 699, 773.

We are indebted to R. Clement Lucas for the recognition of joint complications associated with ophthalmia neonatorum. His first report, in 1885, was greatly criticised, and suggestions were freely made that his case might have been one of epiphysitis or syphilitic synovitis. With the exception of a case by R. G. Fendick, no parallel case was recorded in Great Britain for thirteen years. When in 1899 Lucas again introduced the subject, a search through European medical literature had resulted in the discovery of only twenty-three cases. Since 1890 A. E. Garrod, J. Mitchell Bruce, Sydney Stephenson, and L. Vernon-Jones have called attention to the joint affections complicating ophthalmia neonatorum, and quite recently C. O. Hawthorne reports a case confirming the results of the earlier observations, more especially as regards the possibly quiet nature of the arthritis and the prompt and thorough restoration of the efficiency of the affected joints. Unfortunately there was no bacteriologic examination in this case, although there was positive medical testimony that both father and mother had been infected with gonorrhœa shortly before the child was born, and the child began to suffer from purulent ophthalmia on the second day. It may be added, however, that in several other instances on record there was undoubted bacteriologic diagnosis of gonococcus infection in both the conjunctival discharge and the synovial effusion. In this connection Lucas defines two varieties of arthritis, namely: (1) a very acute form with features suggesting a tendency to suppuration; and (2) a milder form accompanied by a great deal of effusion and pain on movement, but with little or no surface redness. Hawthorne's case adapts itself exactly to this latter form. The promptness and completeness of the restoration of the joints to normal is in pleasing contrast to the obstinate nature of the ordinary gonorrheal arthritis. The explanation is doubtless to be found in the comparative ease with which the conjunctival discharge may be checked, and, as noted by Hawthorne, this fact lends emphasis to the statement that the cure of the urethral or vaginal discharge is of first importance in treating cases of gonorrheal arthritis.—*Am. Med., April* 25, 1903.

86. A Report of Final Results in Two Cases of Polyarthritis in Children of the Type First Described by Still, together with Remarks on Rheumatoid Arthritis. By Royal Whitman. *Med. Record*, April 18, 1903.

R. Whitman reports two cases differing in some particulars from those described by Still. In one there was complete recovery, of which Still records no instance. He mentions enlargement of the spleen only, yet in both these the liver was enlarged, in one ending in amyloid degeneration. In Still's cases the joints of the fingers and toes were exempt, while the spine was involved at an early period of the disease. In one of these all the small joints were diseased, while in neither was the spine affected. Still mentions slight pitting of the cartilage in one case that came to autopsy, while the writer's examination shows that such erosion is inevitable. The case in which recovery occurred was treated by daily exposure of the naked body to heat and light supplied by numerous electric lights beneath a tent-like covering. The cure was apparently completed by an attack of scarlet fever. The writer classes this disease as an atrophic form of rheumatoid arthritis, considering it as distinct from osteo-arthritis or the hypertrophic form of arthritis deformans. It is the common form in early life. The symptoms simulate tuberculosis so closely that diagnosis is impossible until extension to other joints shows the true character. The appearances suggest the effect of a continuous feeble irritation within the joint and a feeble reaction. This indicates the removal of depressing influences, proper nourishment, and stimulation of local nutrition. Deformity should be prevented and corrected, and there should be local support to relieve painful motion. The cause of the disease is obscure.—*Abst. Am. Med.*

87. On Hydrops and its Treatment with Medicine. By Sontag. *Wien. med. Presse*, No. 28.

Argwim, a combination from theobronium with acetate of soda, was tried. It was well borne, and had in selected cases a most favorable action, especially in combination with digitalis or caffeine.—*D. Townsend, Boston.*

88. Intermittent Hydrops, Healing by Means of Iodoform Glycerine Injection. By Wiesinger. *Deutsch. med. Woch.*, Aug. 27, 1903.

Wiesinger describes a case of intermittent hydrops treated by means of the iodoform glycerine injection. He discusses the etiology of the disease and its treatment. He advises local treatment in the acute stage, and uses iodoform glycerine injection because one may expect thereby a more favorable action on the joint, which will last for a longer period on account of the gradual absorption of the drug. He is inclined to consider intermittent hydrops as a special though peculiar form of synovitis, but emphasizes the need for a more thorough study of the condition.—*David Townsend, Boston.*

89. A Case of Acute, Non-traumatic Multiple Osteomyelitis, Produced by the Streptococcus occurring in a Male Adult. By John T. Bottomley, M.D., Boston. *Jour. Am. Med. Ass'n*, July 25, 1903, xli. 222, No. 4.

The author describes the case and the operative procedures. He comments upon it, and reviews the literature of similar cases. This type he finds rare. There is a similarity between the staphylococcus and streptococcus types. "It seems to be generally agreed that the pus in the streptococcus cases is thinner and the necrosis of bone and soft parts less than in the staphylococcus cases."

He emphasizes the importance of early and accurate diagnosis and the necessity of opening and draining the medullary cavity.—*R. B. Osgood, Boston.*

90. The Chronic Arthritis of Children. By Hans Spitzy. *Zeitschr. für orth. Chir.*, Bd. XI. Heft 4, pp. 699–795.

The author reviews at length the literature and discusses the published cases under the captions:—

1. Chronic Arthritis following Acute Joint Rheumatism.
2. Chronic Arthritis following Infectious Diseases.
3. Primary Chronic Arthritis.

He discusses the pathological anatomy, the differential diagnosis, progression, and treatment in detail, and then reports in full the seventeen carefully studied cases which constitute his especial contribution. The reference list contains 94 titles. The paper is illustrated by figures showing cultures of diplococci from the joint fluid and sections of synovial membrane from one of the cases, also of bone preparations from another case.—*G. W. Fitz, Boston.*

91. Lipoma Arborescens. By Charles F. Painter, M.D., and William G. Erving, M.D., of Boston. *B. M. & S. Jour.*, cxlviii., No. 12.

The occurrence of fatty growths in the joints is not very uncommon, though comparatively few have attracted enough attention to merit publication. They have usually been associated with the existence of tuberculosis or arthritis deformans. They occur as overgrowths of the synovial villi of the joint or as true lipomata that have pushed in from the subserous fat as the result of laceration of the fibrous capsule.

As more cases are being studied, it becomes evident that the etiology is not as limited as was at first supposed. Many conditions may cause the hypertrophy of fringes. Under some circumstances the result is a general villous enlargement, and under others it is confined to one or at most a very few villi. The knee joint is the one most commonly affected, though others are not exempt. In this series the cases are all operative, and have come under observation during the past year.

The seven cases here to be reported in detail are selected from a series of sixteen cases of hypertrophied synovial villi, recently removed at operation, because they seemed to represent distinct tumor formations, and not simply the arborescent overgrowths of the synovial membrane, which are so commonly seen. Doubtless this condition of apparent tumor formation is nothing more than the end result of the villous hypertrophy, but clinically this condition is much the more important to recognize; for the removal of the growth not only rids the affected joint of the cause of its symptoms, but removes from it a source of internal trauma, which would permanently impair the function of the joint if allowed to remain. It is of great importance, then, to recognize these growths in the joints, and, in view of the failure to find tuberculosis as the cause for the hypertrophy in any of the following cases, it seems reasonably certain that isolated villous hypertrophies, without more symptoms of joint disease, will not be found to be due to tuberculosis infection, and consequently the radical operations, which the literature shows have been resorted to in certain cases, are not indicated because one finds villous hypertrophy on opening the joint. The clinical symptoms given are those of a foreign body in the joint, and not of disease of the bones or soft parts.

Coplin, in his Manual of Pathology (pp. 242 and 535), says that he believes lipoma arborescens to be simply a step farther than "cloudy swelling" in the process of fatty degeneration, analogous to the same process in the kidney. He believes it is caused by (1) anæmia, (2) necrosis and caseation, (3) bacterial toxins, (4) embolism, (5) infections, etc. According to Coplin these degenerations develop in subsynovial or subserous tissues, and push their way into the neighboring cavities.

Dalafield and Prudden, in their Pathology (pp. 317 and 779), refer to the lipoma arborescens as pushing into the joints as "tufts" of synovial membrane.

Hektoen-Riesmann in the American Text Book of Pathology simply advance the old theory that these growths are signs of some underlying cause, as tuberculosis or osteo-arthritis.

Haeckel reviewed the literature up to 1888, and described two new cases of lipoma arborescens in his own experience. This article was entitled "Lipoma Arborescens," and appeared in the *Centralblatt für Chirurgie*, April 28, 1888. Later still, in the *Allg. Chi. für Path. und Therapie* (8 Auflage, p. 706), Billroth has another contribution to this same subject.

Stieda, in a carefully written paper on lipoma arborescens of the knee, appearing in the *Beitrag für klin. Chir.*, xvi. 285, 1896, gives an exhaustive review of the literature on the subject up to that date. Including his own two cases, he mentions thirteen, in ten of which the knee was involved, in two the shoulder, and in one the hip.

The first case on record is one described by Goetz in his "Dissert. inaug. Halle.," 1798.

The name "lipoma arborescens" was first given to the condition by Joh. Müller in his "Ueber den feineren Bau und die Formen der krankhaften Geschwulste," while the first suggestions regarding its etiology were made by Volkmann in the *Centralblatt für Chirurgie* for 1885. He classified lipoma arborescens of the joint, with other chronic enlargements, as a condition not of necessity primarily tuberculous, but developing into it.

König, writing in 1885 and again in 1895, considered the condition as a manifestation of tuberculosis only; but, finding later a similar condition in cases of arthritis deformans, he at first tried to distinguish them, and finally admitted the great difficulty in so doing.

Schmolck in 1886 reported two cases, both of long standing, in which at the time of operation a fresh tuberculous lesion was found, from which he concluded the condition to be one of lipoma of the joint, favoring the invasion of the bacillus of tuberculosis.

(1) Lipoma arborescens occurs in a number of chronic joint affections.

(2) It is not a lipoma in the sense of being a "new growth," but is merely a hypertrophy of normal pre-existing tissue.

(3) Its etiology is a chronic inflammatory condition of the joint, arising usually from tuberculosis or arthritis deformans and possibly a condition of negative pressure in joint.

(4) Pathologically, it is an hyperplasia and fatty degeneration of pre-existing synovial tabs, to an extreme degree.

(5) Histologically, the appearance is that of a typical chronic inflammatory condition, with, in addition, a specific appearance in case of tuberculosis.

(6) In an unopened joint, diagnosis is not certain, the swelling, tenderness, limitation of motion, and ability to palpate not being absolutely diagnostic.

(7) Prognosis of spontaneous healing and recovery of joint function unfavorable.

(8) Treatment: arthrectomy (erasion), or, when tuberculosis is present, resection of the joint.

With these conclusions the observations would, in the main, agree. Tuberculosis is given relatively a less important place in the etiology, and the importance is urged of the absence of the clinical evidence of joint disease as leading to the diagnosis of a non-tuberculous condition, and encourages exploration of the joint where any doubt exists as to the nature of the pathological process.

92. Gelatin by Mouth in Hemophilia. *Therapie der Gegenwart*, September, 1902.

Hesse reports the case of a boy eight years of age, whom he has known since birth to be weak, pale, and of slender build. He bruised very easily, and his feet often showed blue spots. After each fall he had extensive ecchymoses, especially if he struck his buttocks. His teeth fell out spontaneously and he had profuse bleeding from his gums. He bled profusely from slight wounds, and often had bloody effusions into his joints. Many things were tried, but without result. About a year ago gelatin treatment was begun. He was given 200 grams (6½ ounces) daily in a 10 per cent. solution mixed with raspberries or lemon juice. The improvement was noticeable from the first day. For months he has not had epistaxis, gum or joint hemorrhage. Blows and knocks produce only slight ecchymoses. His general health is much better. [E. L.]—*Abst. Am. Med.*

93. Joint Disease and Hemophilia. *Practitioner*, 1903, lxx. 85.

The occurrence of chronic inflammations as a result of bleeding into joints in patients with a hemorrhagic diathesis was first noted by König several years ago, but still frequently passes unrecognized. Though one of the more unusual forms of joint affection, it is met with frequently enough, so that its occurrence should always be kept in mind. This is especially important from the fact that operation, which might seem indicated if the condition was not understood, is necessarily attended by such disastrous results. Carless, in a paper on surgical affections of joints, quotes statistics of Poillet, of Lyons, who has analyzed 252 cases collected from literature. This large number of cases indicates that the affection is possibly more frequent than is generally known. In his original paper, König describes three stages of the affection: First, the joints become distended with blood, usually spontaneously, without any history of injury. There is a feeling of tension and pain, but no tenderness or symptoms of inflammation. Ecchymosis may appear within a few days. Usually the effusion is absorbed in a short time, and at first little damage is done. If the hemorrhage is repeated, however, —and this is usually the case,—a chronic form of arthritis is produced. The synovial membrane becomes thickened and rough, the periarticular structures infiltrated, and the articular cartilages and synovial membrane are discolored with blood pigment, and may be covered with partially organized fibrinous tufts, and the muscles are atrophied. In the third stage of the affection, loss of function and deformity occur, caused by proliferation of periarticular tissue and fibrous outgrowths. The affection appears usually in early life, frequently between the fourth and sixth years, practically always in the male sex. Traumatism does not seem to be an etiologic factor. The knee is affected in nearly half the cases, the elbow in about one-fourth of the cases, and the ankle next most frequently. The prognosis is always bad in hemophilia, it being estimated that 60 per cent. of the patients die before the age of eight years; but, strange to say, children affected with arthritis do not seem to have so great a mortality. It is extremely important that the condition be recognized; for a considerable number of cases have been operated upon, with fatal results in nearly every case. Not even puncture or massage is advisable. The limb should be put at perfect rest, cold applications should be made and gentle compression applied. Very little can be done to arrest the progress of the disease; but, if suitable apparatus be applied, much can be done to prevent deformity and relieve pain.—*Am. Med., March* 21, 1903.

94. Disturbances in Growth and Joint Deformities following Traumatic Separation of Epiphyses. *Wien. klin. Woch.*, Dec. 18, 1902.

Lorenz's first patient fell out of bed when six years old, and complained of severe pain in right wrist for some time. Now at nineteen it is found that the growth of the distal portion of the radius has been retarded through a separation at the time of its epiphysis. The ulna has continued its growth undisturbed, has torn itself away from the connecting triangular fibro-cartilage, and produced a deforming prominence at the lower part of the dorsum of the hand. Resection of the bone was advised in this case. In the second, patient of thirty-four, a disturbance in growth of the external inferior portion of the humerus existed as the result of a separation of the epiphysis of the external condyle, when the patient was ten years old. In time the elbow enlarged on the outer side, the ulnar nerve became pressed upon, and trophic changes were set up in its domain. Excellent photographs and radiographs illustrate the deformities.—*H. A. Wilson, Am. Med.*

95. Deformities and Disabilities Resulting from Injuries or Disease of the Epiphyses. *Canadian Jour. of Med & S.*, November, 1903.

In this paper by B. E. McKenzie it is pointed out that bones grow in length at the junction of the epiphysis with the shaft, and that synostosis does not occur till adult life. Disease or traumatism may cause synostosis at an earlier time and consequent interference with the growth. Where bones are parallel, such as in the case of the tibia and fibula, interference with the growth of one of the bones may cause a disparity and consequent deformity.

Injury at the site of the epiphyseal cartilage may cause a part of it to become osseous while the remaining portion continues to grow. One case is reported where this occurred at the junction of the lower epiphysis with the shaft of the femur, growing at the inner portion while the outer had become osseous. Genu varum resulted in the affected limb.

The treatment of these cases has been eminently successful. Seven such cases are reported. Where there had been interference with the growth of the lower end of the tibia, it was necessary to remove a section from the shaft of the fibula to shorten the bone. Then after a linear osteotomy of the tibia the deformity was corrected. In a person whose age was such that there would be still several years of growth it was necessary also to chisel out the epiphyseal cartilage from the fibula, so that there might not be continued growth, causing a recurrence of the deformity. In persons whose age is such as to make much increase improbable in height of the patient in the succeeding years, simple osteotomy of the shorter bone will, with the removal of the section from the longer bone, prove satisfactory. In the case of genu varum resulting from partial synostosis of the femoral epiphyseal cartilage, the age of the patient being sixteen years, simple osteotomy proved sufficient.

Two cases are reported of acute epiphysitis at the hip joint, causing a condition resembling somewhat the worst forms of congenital dislocation. Transposition of the portion of the head and neck remaining in one of these cases has secured better anchorage in front of the acetabulum, and osteotomy following has succeeded in placing the more deformed limb in a greatly improved position.

96. Diagnosis of Tuberculosis of Bones and Joints. By Ludloff. Trans. XXXII. German Surg. Congress. *Centr. für Chir.*, 1903, Suppl., p. 5.

A study of the finer details of the skiagraphic appearances of normal and diseased knees of children, which the author expects to be the means of greater precision in the diagnosis of focal infections and at an early stage. He finds:—

(1) In the antero-posterior view of the knee, from the second to the fifth year, the presence normally of protuberances on the internal condyle at the epiphyseal line.

(2) In the lateral view, the presence of an "epiphyseal spot" in the anterior part of the condyle from first to fifteenth year, as long as the epiphyseal line exists as such.

The examination of tuberculous knees has shown certain alterations in the appearance of these protuberances and the epiphyseal spots to be characteristic of tuberculosis.

Sagittal illumination shows the protuberances to be diminished or absent, the condyles enlarged as if "blown up," peg-like projections extending downward toward the tibia. Lateral view shows the epiphyseal spot larger, more transparent, and deprived of its normal trabecular structure: its contours are sharper. The enlargement is seen to involve not only the condyles, but frequently the heads of tibia and fibula and patella, also.

The reparative process can also be studied by observing these same details.

Further study is needed to determine the relation of these facts to etiology and treatment.—*A. H. Freiberg, Cincinnati.*

97. Sunshine and Fresh Air *v*. The Ultra Violet and Roentgen Rays in Tuberculosis of Joints and Bones. By Dr. De Forest Willard, Philadelphia. *Jour. Am. Med. Ass'n*, July 18, 1903, xli., 154, No. 3.

In treating the tuberculous patient, the first object should be to strengthen the resisting power of the individual, the second to destroy the bacteria.

X-rays and Finsen light affect only a small area. Tuberculosis is a more or less general infection affecting the whole body. The importance of food, sunlight, and fresh air, is therefore great. The results in the author's own practice have been often remarkable. He reviews the work of Finsen and others, and mentions different kinds of lamps. After discussing the theories of action of light rays, he concludes that it is the chemical ray which chiefly influences cell action. His own experiments with the Finsen light and X-rays in combination are described. The following conclusions are reached:—

(1) Sunlight, fresh air, and good food, together with fixation and protection of the affected joint, are the most important agents in the contest with tubercular infection.

(2) All hospitals should have sun rooms.

(3) Tent life, summer and winter, is practical; and sanatoria for the treatment of tuberculosis of the hard tissues as well as the soft are needed.

(4) The absolute value of the actinic and X-rays in the treatment of tuberculosis has not yet been determined, and should be used only to supplement operative and mechanical measures.—*R. B. Osgood, Boston.*

98. **On Varieties of Elbow Joints, Patellæ Cubiti and Processus Anguli Olecrani.** With illustrations. By Kienböck. *Wien. med. Presse*, Nos. 28, 29, 30.

Varieties of elbow joints, on the whole, seldom occur. In one case was found on both sides, interpolated in the triceps tendon, a piece of bone which is to be considered as a sesamoid bone, a kind of patella of the elbow joint. In two other cases was found an orbicular bony process on the posterior border of the tuberosity of the olecranon.—*D. Townsend, Boston.*

CONGENITAL DISLOCATION OF THE HIP.

99. **Present Status of Congenital Dislocation of the Hip and Bloodless Reduction.** By Virgil P. Gibney, M.D., of New York City. *Am. Med.*, May 30, 1903, p. 70.

Attention is drawn to the impetus given to surgeons in dealing with this condition and to the interest developed among the laity by the visit of Lorenz. After describing the Lorenz method, Gibney emphasizes the necessity of stretching the capsular ligament, but warns as to the danger of paralysis of the leg following overstretching. In cases which have passed the age limit of seven or eight years, the aim should be to secure a "lateral position," as Lorenz terms it (head under the antero-superior spinous process), and encapsulation by the "weight-bearing function." In many cases beyond the age limit, after the plaster cast has been removed, he employs hyperextension for a few hours every day by laying the patient on the face and placing a weight of two to ten pounds on the buttocks, and obtains very good results from such treatment. Gibney also advocates in patients over eight years of age the preliminary use of traction by weights of five pounds, increased in three or four weeks to forty pounds, as rendering the reduction much easier.—*J. T. Rugh, Philadelphia, Pa.*

100. **Morbid Anatomy and Treatment of Congenital Dislocation of the Hip.** *Lancet*, Jan. 17, 1903, p. 172.

Mr. T. H. Openshaw presented to the Clinical Society of London the subject, based upon 70 cases which he had observed, and upon 9 of which he had operated. He showed a recent specimen from a girl aged five years who had died from bronchial pneumonia. The head of the bone was normal in shape with the exception of a small area of flattening at the lower end and back part. The neck presented no abnormality. These appearances entirely accorded with what Mr. Openshaw had found by operation. In his experience, in every case an acetabulum existed; but it was small, shallow, and triangular, and the cartilage forming its floor was thicker than normal. In his opinion the head of the femur up to the age of three years remained normal. Mr. Openshaw advocated one of two methods of treatment: (1) reduction of the shortening by tenotomy and extension and then reposition, so called, of the head of the bone by manipulation as practised by Lorenz, or (2) the remaking of an acetabulum by the open method after it had become possible to replace the bone by tenotomy and manipulation. As a result of his experience, in about twenty cases treated by the first method during the past six years he considered, first, that reposition within the joint was an impossibility, and, secondly, that redislocation was exceedingly common. In the discussion, Mr. J. Jackson Clarke said that he had operated upon about twenty cases by the Lorenz method, and in only one instance had he failed to obtain a good result. In the one case the child was suffering from spastic paralysis which had not been recognized, so that the failure was explained. Mr. Noble Smith said that he advocated the manipulative method, dividing the operation into two stages, by which means he believed the amount of force required to effect replacement was much reduced. He preferred an apparatus to plaster of Paris for after-fixation.—*H. A. Wilson, Am. Med.*

101. **A Discussion on Congenital Dislocation of the Hip.** By F. F. Burghard, London. *British Med. Jour.*, Aug. 29, 1903.

The article is chiefly a discussion on treatment, though in the beginning the author gives a review of the anatomical changes which are met, placing special emphasis on the variation of the angle formed by the neck and shaft of the femur. He holds that in young children the dislocation is usually a supra-cotyloid dislocation, which becomes transformed into a common dorsal dislocation as the weight of the body increases. In speaking of the methods for reduction now in vogue, Mr. Burghard takes up first the "Hoffa-Lorenz operation," giving a precise account of the steps of this procedure. He objects to it as a routine procedure on the grounds that ankylosis seems almost necessarily due to the extensive injury to joint surfaces, and adds that the chances for reluxation are much increased, as splints or plaster must be removed early in order to institute passive movements to avert ankylosis.

The author's method is then described. He divides or stretches the adductors, and tries the "Lorenz bloodless" method. If this is successful, well and good. If not, after a week he cuts down upon the joint. His incision is made from just below the antero-superior spine of the ilium in the interval between the sartorius and tensor fasciæ femoris, the capsule is divided in the same line, with the finger the head is guided into the acetabulum. The ilio-psoas tendon is divided, as it is regarded as being a powerful agent in reluxation.

The Lorenz bloodless operation is reviewed, and after a complete statement of the statistics the following conclusions are reached:—

1. That all cases should be checked by radiography, and that no 'cure" should be spoken of that is not a true anatomical cure.
2. That all cases of congenital dislocation under fourteen years should be treated. In the great majority, improvement will result, while in some a true anatomical cure is brought about.
3. That in all these cases Lorenz's manipulations should be tried in the first instance. Even should they fail to effect reductions, they facilitate any subsequent procedures.
4. That the prospect of a cure by the Lorenz "bloodless method" is in direct proportion to the age of the child, and that after the age of four there is little hope of a true cure by this means.
5. That in any case the chances of a true cure by the "bloodless method" are not very great.
6. That an open operation should be done in case the radiograph shows the "bloodless method" to have failed to reduce the dislocation, except perhaps in the case of a very young child under three years, in whom the manipulations may be repeated.

7. That in the open operation no fear need be entertained of shock, bleeding, or sepsis.
8. That under no circumstances should the joint surfaces be remodelled.
9. That an open operation is more calculated to result in a cure, as it enables the surgeon to ascertain beyond doubt when the head of the bone is in the acetabulum.
10. That the open operation is especially suited to cases over four years of age and to those with bilateral dislocation.
11. That after the operation the limb should be put up in the position of maximum stability. In the majority of cases this will be similar to the Lorenz position. The limb should be put up in plaster of Paris, immediately, and the casing should take in the flewed knee. This is essential, in order to insure stability of the head of the bone.
12. That all tense structures should be stretched or tenotomized as a preliminary measure a week or so previous to the open operation. The after-treatment is practically identical with that of the Lorenz method.

In an interesting discussion of the paper,

Noble Smith said that his mind was open as to the value of the relative operations. He owes much to Professor Lorenz, for since seeing him operate he has obtained much more satisfactory results than he had obtained from reading of his method. He reported several reductions, one in a girl seventeen and a half years old.

R. C. Dun said that he had learned much from watching Lorenz, and had operated four cases by this method since his visit with success.

Robert Jones said that until he saw Lorenz operate he had had no idea of the thoroughness of his manipulations. Since his visit he is able to see why so many cases have failed to be reduced in England. Out of 38 cases operated upon by the bloodless method since the visit of Lorenz, he has reduced 34.

A. H. Tubby said that we are never sure in the Lorenz method that the capsule is not enfolded by the head of the femur in an apparent reduction. He thinks that the risks to the patient in this form of reduction are great. He prefers an operation by the anterior incision after exsecting a portion of the adductor muscles.—*N. Allison, St. Louis.*

HIP, DISEASES AND INJURIES.

102. A Study of Good Results in Hip Disease. By V. P. Gibney. *Med. News*, Sept. 13, 1903.

V. P. Gibney calls attention to the fact that many conditions may be mistaken for tuberculous hip-joint disease, such as trauma, periarthritis, coxa vara rachitic or traumatic, congenital dislocation, psoas abscess, poliomyelitis, etc. In reference to our aim in treatment he says: "Good results are those with the minimum of shortening, without deformity, and with the maximum range of motion. Results must be studied on a basis of the stage in which well-recognized methods of treatment are begun. The keen diagnostician will recognize the lesion before the deformity arises and at an early stage, while the poor diagnostician will fail to recognize hip disease until the mother of the child has already made the diagnosis herself. Then the second stage, that of deformity, will have been reached and the advantages of early protection are lost. The tardy recognition of the value of instruction in orthopedic surgery by the medical schools throughout the country is largely responsible for the destruction of hip joints and the hopelessness of restoring functions to points thus impaired. Now we have reason to hope for better results because the large and well-equipped schools of medicine have within the last decade established such chairs, and the younger practitioners who will soon make their influence felt will increase the number of those who get efficient treatment before the second and third stages are reached. In the third stage we must be content with correcting deformity and eradicating necrotic areas and sinuses."—*Abst. Am. Med.*

103. A Cheap Traction Splint. By L. T. Wilson. *B. M. & S. Jour.*, Aug. 27, 1903.

The splint was made primarily for a cheap, light splint for bed traction and one available to physicians outside of large cities where skilled labor, required to manufacture the average splints, is not obtainable.

The upright and foot-piece are made from one piece of three-eighths inch gas pipe. The upright where it joins the pelvic band is simply heated and flattened for about an inch. The lower end forming the foot-piece is heated, flattened, and bent to the desired shape. The pipe should be flattened for about four inches upon the upright for the play of the windlass arm.

The traction windlass is made of one-eighth steel wire, bent at a right angle, one arm being inserted into two holes in the foot-piece, the other lying along the upright, and held by a sliding wire ring. The traction windlass holds the extension straps in one of three ways,—(1) by a slot cut in the wire, (2) by wire pegs inserted into the wire, or (3) by flattening the wire where it crosses the foot-piece and fitting a flat piece of steel to this to hold the straps in place.

The pelvic band is cut from sheet steel, and riveted to the flattened end of the upright and bent to the desired shape. A firmer hold on the upright may be obtained by leaving tabs of steel on the band to be bent around the upright. The band may be re-enforced by an extra steel band. Thigh and calf bands are made of thin sheet steel. The splint is lengthened by cutting the upright in two and inserting a piece of gas pipe of the required length. The perineal straps are riveted to the posterior pelvic band. The pelvic band may be padded with felt or cotton covered with canton flannel. The splint costs from $2.50 to $3.50, and weighs about eighteen ounces.—*A. T. Legg, Boston.*

104. Drainage of Pelvic Abscesses through the Sciatic Foramen. By Schmidt. *Deutsch. Zeit. für Chir.*, Bd. LXIX., Heft 1.

The recommendation to drain pelvic abscesses of acetabular origin through the sciatic foramen was made by Schmidt in *Langenbeck's Archiv*, Bd. XLVI. He believes it has received too little attention.

Reports having used this method in three cases of pelvic abscess following osteomyelitic coxitis. The advantage lies in the natural drainage afforded by the backward course of the wound.

The abscess is first incised anteriorly above Poupart's ligament. Through this wound the finger can palpate the internal surface of the acetabular region.

With the patient lying upon the opposite side, an incision is now made from the tip of the great trochanter to the posterior superior spine of the ilium. After cutting through the gluteus maximus, the interval above the pyriformis is sought. The superior gluteal nerve may here have to be sacrificed. By means of this "supra-pyriform foramen" the finger may now work its way into the pelvic abscess. By drawing the gluteus medius and minimus upward, the capsule of the hip joint may be explored. This is facilitated by prolonging the incision downward thus simulating the Kocher incision for resection.—*A. H. Freiberg, Cincinnati.*

105. A Further Contribution concerning Acute Osteomyelitis in the Region of the Hip Joint. By Honsell. *Beitraege z. klin. Chir.*, Bd. XXXIX. Heft 3.

A continuation of the study of these cases made by the author with v. Bruns and reported in *Beitr.*, Bd. XXIV. Heft 1. Mention is made of articles upon this subject which have since appeared by Beker, Koenig, Mangoldt, and Hartmann.

As material for this paper, 15 additional cases occurring since 1899 are used, together with some of the original 106 cases, which have been further observed. The questions considered in this paper embrace the inflammatory deformities of the upper femoral end, cases pursuing an unusual course, those presenting diagnostic difficulties, and finally the methods of treatment.

In all of the 15 new cases the femur was the primary seat of the disease. In the former publication the fact was emphasized that in osteomyelitis of the joint regions the foci of inflammation, as a rule, remain circumscribed for a long time or even permanently. Not only in the beginning, but often months after this, circumscribed centres of softening are found in head, neck, and trochanter, not larger than a pea or cherry stone, while diffuse infiltration of spongiosa and total necrosis of the femoral segment are unusual. When these foci become confluent, irregular cavities form which are usually recognizable in the skiagram, and which sooner or later perforate the bone and discharge externally. Located beneath the articular surface of the femoral head, the cartilage is either lifted or broken through in many places, and the head loses its normal shape by caries, and is not infrequently luxated from the socket. When the region of the epiphyseal line is chiefly concerned, loosening of the head may occur with faulty reunion, or dislocation of the femur, ankylosis of head and acetabulum, necrosis or caries of the head as its result. Purulent arthritis always occurs because of the intra-articular position of the epiphyseal line. Large foci may cause bending or fracture of the femoral neck. The new cases reported illustrate a number of these conditions. Skiagraphic tracings are given.

The cases of osteomyelitic coxa vara are very interesting. Three varieties are described:—

1. The whole upper end of the femur is bent, including the trochanter.
2. Bending at the insertion of the neck, so that, while the axis of head and neck is straight, it makes a right or acute angle with shaft.
3. The head and neck are bent toward the trochanter minor. The bend may be caused either by the size of the foci of softening or by nutritional disturbance from the neighboring suppuration. So, too, the coxa vara may result from the faulty reunion of a loosened epiphysis or spontaneous fracture of the neck.

The author takes exception to Schuchardt's statement that the clinical course and anatomical changes always stand in a definite relation to each other. Cases of foudroyant character often show lesions of surprisingly slight extent. However, it may be said that extensive abscesses of soft parts, affection of other bones, involvement of viscera, together with the virulence of the infective material, are of greater importance from a prognostic point of view than the extent of the process in the upper end of the femur. It is also noted that recurrences and recrudescences of the disease in the hip are apt to be frequently malignant in course and termination. The prognosis of cases in early childhood is said to be relatively very good. At this age, also, the treatment may be of a more conservative character. Koenig's view that the acute suppurative coxitis of infancy involves almost without exception the synovial membrane only is not borne out by Honsell's investigations.

In the diagnosis of difficult cases the X-ray is considered of the greatest value. This is particularly true of those cases in which separation of the epiphysis simulates congenital luxation.

With regard to resection in these cases it is held to be unnecessary in many of the less severe and in which there is no external evidence of suppuration. This is also true of many apparently graver cases occurring in the first years of life. The skiagram is largely depended upon to decide the necessity of resection in preference to simple incision and also regarding the amount of bone which must come away.

The 15 new cases are reported in full.—*A. H. Freiberg, Cincinnati.*

106. The Rôle of Atmospheric Pressure in the Hip Joint. By S. W. Allen.
B. M. & S. Jour., April 9, 1903.

Allen reviews the statements as to the atmospheric pressure in the cotyloid cavity, and has experimented with cadavers, successively cutting the muscles, capsular ligament and cotyloid ligament. The results of his experiments are that what holds the bone together is primarily the cotyloid and secondarily the capsular ligaments (in life, elasticity of the surrounding structures helping them out), and that the air pressure need not be considered.—*Abst. Jour. Am. Med. Ass'n.*

107. **Acute Epiphysitis causing a Condition subsequently simulating Congenital Hip Misplacement.** By John Prentiss Lord, M.D., Omaha. *Jour. Am. Med. Ass'n,* Aug. 1, 1903, xli. 305, No. 5.

A child at sixteen months had severe lobar pneumonia. An abscess formed over the hip during convalescence. This was opened, and quickly healed without definite evidence of articular disease. When seen by Dr. Lord, there was no evidence of hip disease. The limb was freely movable in all directions save abduction, which was restricted. The deformity was typical of congenital misplacement. An unsuccessful attempt after the Lorenz method was made to replace the hip. Then a bloody Lorenz-Hoffa operation was done, and the head of the bone was found to have been nearly completely destroyed. The author quotes the opinion of Dr. W. R. Townsend, Dr. Royal Whitman, and Dr. Lorenz on the treatment of this condition. He points out the difficulty of successful reduction by manipulation when, as here, the epiphysitis has almost completely destroyed the head.—*R. B. Osgood, Boston.*

108. **Floating Pseudarthrosis of the Hip resulting from an Osteomyelitis of the Joint occurring Early in Life.** By Ducroquet and Bezancon. *Presse Med.*, No. 15, 1903.

A child sometimes presents the appearance and gait of congenital luxation of the hip joint, but palpation shows that there is no trace of a neck to the femur and it feels as if it had been decapitated. Radiography confirms this absence of the neck and also of the upper epiphysis of the femur. A scar is also found, and the parents relate that in early infancy the child had a period of fever and restlessness, terminated by the development of an abscess in the hip, which opened spontaneously or had to be incised. As soon as it was evacuated, the child appeared to be restored to normal health. The rapid recovery excludes the idea of tuberculosis. In one of the four cases described, the mother had an abscess at the time; and in another a vaccination pustule had become secondarily infected. In one of the cases, abscesses developed simultaneously in several joints. The prognosis of this floating pseudarthrosis is very grave. There is no ankylosis and no tendency to the formation of a socket in the ilium, owing to the absence of the neck and otherwise defective development of the head of the femur. One of the cases was treated on the mistaken diagnosis of congenital luxation, with the inevitable result of total failure of all attempts at reduction. The only treatment is the appliance devised for inoperable congenital luxation on the principle of Dupuytren's girdle. In taking the cast, a socket for the top of the femur must be made in it, and in the appliance, to hold the head of the femur down. Another important point is to hold the shoulder and pelvis at the proper distance apart. This is accomplished by having the corset reach to the axilla, and making it a little higher on this side than on the other. *Abst. Jour. Am. Med. Ass'n.*

109. **The Treatment of Fracture of the Neck of the Femur at Bellevue, St. Vincent's, and New York Hospitals.** By Joseph B. Bissell. *Phil. Med. Jour.*, May 30, 1903.

J. B. Bissell details the results of the treatment of a series of 316 cases of fracture of the neck of the femur in the Bellevue, St. Vincent's, and New York Hospitals. In none of these cases was an operation performed, either to unite the fractured surfaces, to remove a detached head, or to carry on or assist in any manner the treatment. It seems that in all three of the hospitals the patients were kept in bed either longer than was necessary or not long enough. If the broken neck would not unite at the end of six weeks under treatment while confined to bed, it is hard to be convinced of the possibility of its uniting at the end of eight or nine weeks, especially as "splints" do not, in most cases, prevent motion between the fragments and do not secure perfect coaptation, neglecting in this way the two essentials—immobilization and firm coaptation—without which a "splint" is not only useless, but of positive harm. The experience of the writer has led him to a much more optimistic view than is usually held; and he would suggest that the best treatment for this injury would be an open operation, with the pegging or wiring of the fragments, or the application of whatever other method or means may be necessary to retain them in a correct position until bony repair takes place.—*Abst. Am. Med.*

KNEE.

110. Epiphyseolysis with Subcutaneous Periosteotomy in the Treatment of Genu Valgum Infantum.

By Dr. Max Reiner. *Deutsch. med Woch.*, July 2, 1903.

Reiner reviews his article on "Bloodless Operative Epiphyseolysis" in the treatment of genu valgum of adolescence, which appeared in the *Zeitschr. für orth. Chir.*, Bd. XI.

He considers the difficulties of epiphyseolysis in children about eight years and up, and recommends instead subcutaneous periosteotomy. He describes this method, the periosteotome which he uses, and the after-treatment, which is the same as that of epiphyseolysis without periosteotomy.

In the Vienna Institute for Orthopedic Surgery, cases of genu valgum from eight to seventeen years of age are treated by the bloodless epiphyseolysis method; those older than seventeen years of age are treated by "circumference osteotomy"; those younger than eight years of age are treated by the subcutaneous periosteotomy method.—*D. Townsend, Boston.*

111. Traumatic Injuries of Meniscus.

By E. Bovin. *Upsala Laekareforenings Foerhandlingar*, viii., Nos. 3–6.

Bovin has found in the literature reports of 163 cases of total or partial extirpation of the meniscus on account of traumatism. He tabulates the details of 148 of them: all but 26 were cases of rupture. He further gives the complete history of 10 cases he has personally observed and treated. He also gives his conclusions in regard to the physiology and anatomy of the meniscus from the study of 15 fresh and 36 formalin-hardened specimens. He affirms that the meniscus is not a rigid and unyielding body, but changes its shape and position under the influence of traction and pressure. Twelve photogravures accompany this comprehensive article. The median meniscus is found injured much more frequently than the lateral, and isolated rupture of the capsular insertion was the most frequent of all. A recent injury of the meniscus is often mistaken for an internal sprain or contusion with hemarthrosis or for acute traumatic synovitis. An old injury may be mistaken for a free or pedunculated body in the joint or other lesion. The slightest suspicion of recent injury of the meniscus imposes the necessity of immobilization and bed rest for three or four weeks after the dislocated cartilage has been replaced. In chronic cases an operation will usually restore normal function to the joint. An old injury of the meniscus left to itself is liable to seriously compromise the function and entail chronic synovitis, and possibly arthritis deformans. The meniscus was sutured in 39 cases, and in 6 there was recurrence. Infection and ankylosis occurred in 2, and protracted convalescence in 1. The longer manipulations required for suture increase the probabilities of infection. Effusion requiring tapping a few times followed in 1 case. In 2 others the movements of the joint were somewhat restricted, probably from the longer mobilization required after suturing than after extirpation. Bovin resorted to suture only once. This was a case of recurrence of the disturbances after partial resection. The fragment of the meniscus that had been left was sutured to the capsule with perfectly satisfactory results.—*Abst. Jour. Am. Med. Ass'n.*

112. **Fracture through the Site of an Excision.** *Canadian M. & S. Jour.*, January, 1903.

Dr. Galloway reports an interesting case of a man more than forty years of age whose knee had been excised Sept. 18, 1900, because of tubercular disease and deformity of the knee. Nine months after the excision, having made a misstep when moving backward down some veranda steps, the leg was fractured at the site of the excision. The limb was at once placed upon a posterior splint with some pressure over the seat of the fracture by a thick covering of absorbent cotton beneath the bandage. A week later, the effusion of blood beneath the skin being considerable, it was withdrawn by aspiration. The line of fracture could be felt plainly. There were serrations of bone extending upward into the femur and downward into the tibia, showing that the yielding had been at points other than exactly the line of union. The patient was able to walk upon the limb within two months. He continued to wear a back splint for protection for several months afterward.—*B. E. Mackenzie, Toronto.*

113. **Congenital Hyperextension of the Knee.** By Édouard Delanglade. *Revue d'Orthopédie*, May, 1903.

After studying the pathological anatomy of the cases and indications for treatment, the following conclusions have been reached:—

1. In congenital hyperextension of the knee there is a congenital partial luxation of the knee.
2. There is a forward displacement of the lower epiphysis of the femur, which increases the deformity.
3. Malposition is maintained by (1) the anterior muscles, (2) the posterior muscles which are drawn out of their normal position, (3) by the anterior ligamentous contractions.

Taking advantage of the pliability of the tissues in infants, the best one can hope for is:—

1. Reposition of the tibia maintained until the articular surfaces shall be established to meet the normal position.
2. Endeavor to get right-angled flexion of the knee gradually, so that the displacement of the lower femoral epiphysis may be corrected.
3. Frequent manipulation and kneading of the soft tissues should precede reduction, the hip being flexed, abducted, and rotated outward, so that the resisting muscles may be relaxed as much as possible, relaxing the fascia lata and sartorius.—*Robert Soutter, Boston.*

SHOULDER.

114. **Myogenous Elevation of the Scapula.** By Manasse. Trans. XXXII. Germ. Surg. Congress. *Centr. für Chir.*, 1903, Suppl., p. 150.

A case is reported in which the deformity was overcome by cutting the levator ang. scap. and the rhomboidei, which were in a state of tonic contraction, and resection of the upper and inner angle of the scapula. After seven weeks the deformity recurred, however, because of reunion of the levator with the bone. Resection of the levator and rhomboids resulted in the permanent correction. However, this operation was followed by clonic spasms in both pectorals and serratus anticus, so that the bone made jerky movements upwards, forwards, and outwards. These were not overcome by resection of the pectorals, but galvanic treatment was of much service.—*A. H. Freiberg, Cincinnati.*

115. **Congenital Absence of the Clavicles with Photograms and Radiograms: Cleido-Cranial Dysostosis.** By Harry M. Sherman, M.D., San Francisco, Cal. *Am. Med.*, April 11, 1903, 569.

Sherman reports two cases of this unusual condition which came under his own observation, and cites four cases reported by Marie. In the younger patients there was present practically no interference with function, but in one of the older ones there was decided impairment. As a causative factor, rickets seemed most pronounced, and stigmata of degeneration were present in all. Marie believes the condition to be hereditary at times, but that it does not run for more than two generations. Nothing is suggested as to treatment; but, should the interference with functions be serious, the thought arises that a piece of rib might be used to take the place of the clavicle.—*J. Torrance Rugh, Philadelphia, Pa.*

FOOT.

116. **Flat Foot.** By Huhner. *Am. Jour. Med. Sci.*, May, 1903.

Huhner reports his results of the examination of the feet of 132 white subjects in his study of weak feet. He finds that 64 per cent. of the males and 79 per cent. of females had pronation of the feet in some degree. He concluded that the reason for the greater proportion in females lies in the vicious styles of feminine footwear.

In 69 male and female negroes examined he found the feet were pronated in 85 per cent. He attributes this greater percentage in negroes to their laborious occupations. He describes the anatomy of pronated feet, and recommends the device of Lovett and Cotton for the milder grades. He thinks rigid foot-plates deprive many of these cases of the muscular action they need and induce atrophy.—*John L. Porter, Chicago.*

117. **Flat Foot in Infants and Children.** By R. W. Lovett. *Jour. Am. Med. Ass'n*, April 18, 1903.

The arch of the foot exists from birth. The deformity is generally due to heavy children walking early, especially when they are rachitic. It differs from flat foot of adults in that there is no tendency to fixation in the abnormal position in infants. The cause is the disproportion of the weight and strength of the muscles. The usual shoes worn are not suited for those who present flat foot. It is a mistake to suppose that moccasins and going barefoot will overcome the difficulty. A good boot will improve a flat-footed child's standing as soon as it is put on. The muscles should not be cramped, and rigid supports avoided. A Thomas sole will often correct the deformity. In severe cases metal or celluloid supports may be required, the latter being preferable. Some cases may require a shoe with an upright rod attached to the leg. Pain is rarely complained of in infants and children, but the deformity should be treated and the muscles trained and massaged.—*R. Soutter, Boston.*

118 **Considerations on Pathological Treatment of Flat Foot.** By Dr. L. Heusner, Barmen. *Zeitschr. für orth. Chir.*, xi. 2.

Flat feet are to be grouped under the three heads congenital, rachitic, and contracted, the last-named coming under the physician's care on account of pain. Rigid valgus is carefully described; and a case is referred to which resisted ordinary treatment, including forcible correction under ether with fixation by plaster. Finally, an apparatus was tried which consisted of a strong steel spring with each end fastened into the soles of the shoes in such a manner that it held the feet turned in and supinated. Such an apparatus acts in the same way as manual correction, and has the advantage in acting continuously.

Then a colleague of the writer reports his own stubborn case of flat feet, and goes into details as to the various shoes and supports he has tried. Finally there is a review of the operative procedures for flat foot.—*Henry Feiss, Cleveland.*

119. **Weak Foot in Nurses.** By J. C. Stewart. *Am. Jour. of Surg. & Gyn.*

The author mentions the prevalence of weak foot in nurses, especially those just starting their training. The first sign of trouble is pain along the inner side of the foot or running up the leg to the knee or into the thigh. One foot is usually first affected, but the other soon follows. Examination at first shows no deformity, but on manipulation the tendons of the peronei muscles are found tense, and the nurse walks with feet turned out and adopts a "clumsy wooden gait." Such cases neglected become confirmed flat feet.

As a preventive, the author advises that all nurses should wear sensible "man-fashion" shoes with wide soles and low heels.

A case showing signs of weakness should be treated by cold showering, massage, and gymnastics. Where painful and showing pronation, the shoe should be built up one-fourth to three-eighths of an inch along the inner side.

If the foot has reached the spasmodic stage, it should be over-corrected under general anæsthesia and put up in plaster, followed in two or three weeks by plates.—*A. T. Legg, Boston.*

120. **A Case of the Disease of Ehret.** By C. Pantaleoni. *Arch. di Ortop.*, 1903, xx. 2.

A girl of fifteen years entered the Institute March 9, 1900. In January, 1899, she slipped, and this brought about much distortion of the left foot. The ankle became swollen, and the pain was so great that she was obliged to remain in bed for some days. Used cold baths and massage. In spite of this treatment the foot began to turn to the varus position. When she was admitted, the position of the foot had become persistent. No disease of the nervous system, and the manifestations were entirely local. The treatment was by massage, gymnastics, and electricity. A boot with elastic traction was also used. Dismissed April 9, and the continued use of the boot recommended. There was one relapse, but after some months the cure was maintained.

121. **On Herpes Progenitalis and Pain in the Pubic Region, Caused by Flat Foot.** With illustrations. By S. Ehermann. *Wien. klin. Woch.*, No. 34.

The frequent coincidence of herpes progenitalis and flat foot is traced by Ehermann to a mechanical tearing of the common pudendic nerve (nervus pudendus communis) through the altered static relation of the thigh and pelvis due to the valgus.—*D. Townsend, Boston.*

RHEUMATISM AND RHEUMATOID AFFECTIONS.

122. **On the Condition of the Blood in Rheumatoid Arthritis and Osteoarthritis.** By William G. Erving, M.D., of Boston, Mass. *Am. Med.*, Sept. 12, 1903, p. 440.

Erving reviews the somewhat limited literature of these diseases, and finds that but little investigation has been made regarding the hemic conditions in them. The opinion held by Bannatyne and Forsbrooke, as well as by most clinicians, was that anæmia was always present, there being, according to the latter writer, a decrease of 77 per cent. to 52 per cent. in the red corpuscles and of 55 per cent. to 25 per cent. in the hemoglobin. Erving reports a series of 40 cases, 20 of each condition, in which careful examination was made and the results tabulated. These cases were all in the active stages of the disease, and many of them presented the marked anæmic appearance so frequently observed in these conditions. In both groups the results were "a red blood-corpuscle count ranging slightly above the normal, while the hemoglobin percentage is close to the 100 mark." "No abnormal elements or signs of hemic degeneration were found, and to all appearances the formed elements of the blood were practically unaffected in the acute stages of the disease."

Further observation is hoped for to explain the differences between clinical observation and microscopic findings.—*J. T. Rugh, Philadelphia, Pa.*

123. **The Passing of Chronic Rheumatism.** By James J. Walsh, M.D., Ph.D., New York. *Jour. Am. Med. Ass'n*, Aug. 29, 1903, xli. 540, No. 9.

The author calls attention to the prevalence of the so-called "chronic rheumatism" and to the looseness and inaccuracy of the use of the term. Among the many conditions which are often diagnosed as chronic rheumatism he mentions flat foot, relaxed joints, occupation neuroses, gout, the various forms of neuritis, and especially the different types of rheumatoid arthritis or arthritis deformans. He ends with a strong plea for a more careful classification of cases commonly called "chronic rheumatism," and therefore their more rational treatment.—*R. B. Osgood, Boston.*

124. **Study of Articular Rheumatism in Relation to Other Joint Affections.** *Centralblatt f. d. Grenzgebiete der Med. u. Chir.*, Jena, v.

In this communication from Moscow forty-six of the latest articles on articular rheumatism are reviewed, including a number of Russian works. The writer first points out the incongruity of the term "rheumatism" from rheuma, a flux, as applied to many joint affections. Physicians usually content themselves with the term "rheumatic" as meaning an affection due to getting chilled, but late researches demonstrate that this is very unscientific and entails confusion. They should trace the joint affection to its actual cause. When this is done, it will be found that a new classification is necessary. The term "chronic rheumatic polyarthritis" will be reserved for the chronic multiple joint affection in which there is known to be an unmistakable connection with acute articular rheumatism. The cases which have been hitherto labelled chronic articular rheumatism, but whose origin is obscure, will be classed as chronic polyarthritis without any descriptive term. This is certainly better than to ascribe to rheumatism, cases which have nothing in common with it except the external appearance. Acute articular rheumatism very rarely passes over into the chronic form, and consequently the number of cases of true chronic rheumatic polyarthritis will be found very small. The domain of progressive deforming polyarthritis will contain besides the essential polyarthritis deformans and malum senile coxæ the varieties which have been known as polyarthritis chronica villosa hyperplastica, many cases of nodular rheumatism, and some of Heberden's nodules (others will be found to belong in the class of uric polyarthritis). As the physician learns to trace the connection between the polyarthritis and various infections, he will distinguish between the true rheumatic acute and chronic polyarthritis and the gonorrheal, the erysipelatous, the typhoid, and the pneumococcous. Possibly also the scarlatinal, dysenteric, tuberculous, syphilitic, the neurogenic (in case of tabes and syringomyelia), the polyarthritis accompanying osteoarthropathy of Marie-Bamberger, and polyarthritis deformans progressiva, urica, and possibly also polyarthritis urica, syphilitica, et deformans. This makes fifteen classes besides that of simple polyarthritis chronica.—*Abst. Jour. Am. Med. Ass'n.*

125. **Metabolism in Gout.** By T. B. Futcher. *Practitioner*, August, 1903.

T. B. Futcher writes with special reference to the relationship between the uric-acid and phosphoric-acid elimination in the intervals and during acute attacks of gout. He reports a careful study of three cases and gives charts of each, showing a parallelism between the curves of the two acids which he believes is a fairly constant one in gout. This intimate association of the two acids seems to point toward a common cause and to suggest a common source. The author's summary of the study is: "The analyses in the cases reported suggest very strongly a close parallel relationship between the uric-acid and the phosphoric-acid excretion in gout. They further point in favor of the view that both are products of nuclein disintegration. In the quiescent intervals both phosphoric acid and uric acid are markedly reduced below normal. Two or three days after the acute arthritic symptoms commence, the phosphoric acid and uric acid gradually increase until they reach the average normal output or even the upper limit for normal. As the acute manifestations subside, both steadily fall and remain below the lower limit for normal until the onset for the next acute attack."—*Abst. in Am. Med.*

126. The Incidence of Gout. By Futcher, Crombie, and Toogood. *Practitioner*, July, 1903.

I. In the United States.—T. B. Futcher says that the apparent infrequency of gout in the United States is due in large part to failure to recognize the disease. Out of 15,697 medical cases admitted to Dr. Osler's wards in the Johns Hopkins Hospital during a period of fourteen years there were 41 cases of gout, or 0.26 per cent. of the total number of medical patients. For the same number of years at St. Bartholomew's Hospital there were 124 cases out of a total of 33,356 medical admissions, or 0.37 per cent. of the medical cases. Thus the admissions of gout to a general hospital are a little less than one-third more frequent in London than in Baltimore. All of the 41 patients in the series reported were males, and 32 were native-born Americans. Alcohol and lead seemed to be the most potent etiologic factors. II. In the Tropics.—A. Crombie states that gout is much less frequent in Calcutta, and probably in other hot climates, than it is in Europe among the same class of patients. The cause of this comparative infrequency is believed to be the lower tissue metabolism which is required to raise the temperature of the body through a smaller number of degrees. In addition to this there is among the natives who adhere to the rules of their religion the less nitrogenous nature of their diet. III. Gout as it occurs among the Poor.—F. S. Toogood states emphatically that the consumption of malt liquor is the chief, if not the only, cause of the production of gout. Hence he doubts that the really poor, meaning those in the clutches of downright, grinding poverty, ever develop gout. Occupation influences the production of the disease to a very slight extent. Work involving special strain upon certain joints has no effect in determining the first joint to be attacked. Acute attacks of gout in the poor subject are manifested by the same symptoms as in patients of other grades of society. A characteristic deformity of the fingers in cases of chronic gout which Toogood has not seen described is caused by the hyperextension of the joints between the proximal and the middle phalanges and the flexion of joints between the middle and distal phalanges. Toogood has examined the joints of a number of subjects who died from chronic nephritis, and found in a considerable number of them crystals of sodium urate, although none had given a history of antecedent gout. This point needs further study.—*Abst. Am. Med.*

127. Osteitis Deformans: R port of a Case. By H. J. Sommer. *Am. Med.*, Aug. 8, 1903.

Sommer, after citing the reported cases of osteitis deformans, reports a case of typical osteitis deformans, involving practically all groups of bones (namely, head, spine, thorax, and extremities), whereas most cases show extensive hyperostosis of either (1) the bones of the head, (2) the trunk, (3) the extremities, or (4) trunk and extremities. Especially unique in this case was the condition of the ribs on the lateral aspect of the thorax where the hyperostosis was most marked, obliterating the intercostal spaces and causing the ribs to look and feel like a large flat bone with corrugations. Radiographs could not be taken, and no post-mortem was allowed. The disease lasted eighteen years. The complete measurements of bones are given.—*A. T. Legg, Boston.*

RICKETS.

128. Hitherto Disregarded Sign of Rachitis. By R. Neurath. *Wien. klin. Woch.*, Vienna, xl. 1617.

Photograph of chubby hand in which fingers show marked deformity of bones. Phalanges appear to be swollen, giving the fingers a spindle-shaped appearance between the joints. He has observed it only in rachitic children, and usually in those under a year old. When noted in older children, the rachitis is always in a severe form. He was never able to discover the lesion in non-rachitic children or in those only slightly affected. It was always accompanied by enlargement of the epiphyses and ends of the ribs. He found he could diagnose rachitis in children before examining them elsewhere merely by feeling for the spindle-shaped enlargement of the phalanges. It subsided under "phosphorous cod-liver oil," in conjunction with the other symptoms of rachitis.—*Abst. Jour. Am. Med. Ass'n.*

129. Late Rachitis. *Zeitschr. für klin. Med.*, Bd. XLVIII. Heft 1 & 2.

E. Roos reports a case of a female child who learned to walk properly at the end of the first year, but had some difficulty in walking, together with gastro-intestinal symptoms, in the second year, then fully recovered. In her eleventh year she began to show changes in her gait. In the course of another year there developed marked bowing of the fore arms and legs, with a high degree of epiphyseal enlargement. The cranium and ribs were not affected. The case is doubtless one of true rachitis, either developing for the first time in the eleventh year or being the recrudescence of a short, doubtful attack occurring in the second year. Another doubtful case of late rickets is also described, and the literature on the subject carefully reviewed by the author. There are some differences between rachitis occurring in childhood and that developing in the second decade, the most marked being the non-participation of the cranial bones. This is accounted for by the slight growth which takes place in the bones during the latter period. The results of post-mortem and of Roentgen ray investigations show the identity of the two conditions. On the surgical side numerous local bone changes have been observed in adolescence, such as genu valgum and varum, scolioses, etc., which show anatomic and pathologic similarity to those deformities as they occur in childhood. Rachitis has thus proved to be a disease which may develop at any time during the period of growth.—*H. A. Wilson, Am. Med.*

TORTICOLLIS.

130. The Pathogenesis of the So-called Mental Torticollis. By V. Bedruschi and P. Bossi. *Arch. di Ortop.*, Milano, 1903, xx., fasc. 2.

A serving-woman of forty-six years had a brother who was sent to the asylum last May for mental alienation. Since that time became low in spirits by this preying on her mind, and two months ago torticollis began. The neck is now flexed forward and touches the left shoulder, but in dorsal decubitus is carried to the normal position, where the patient can retain it voluntarily for a few moments. The right shoulder is lower than the left. There is marked cervico-dorsal kyphosis with convex lateral deviation to the right of the line of the cervical and dorsal spinous apophysis. There have been a number of observations of this form of disease. It cannot be cured by suggestion, and surgical intervention is irrational. Recent operations by Kocker and Ebers show its uselessness.

1. Mental torticollis cannot be assimilated with tics, and it is distinct from spasms.
2. It ought not be the expression of a psychic disorder, but comes from an indefinable irritative condition from the motor zone of the cortex.

131. **On the Etiology of Spastic Torticollis.** By Dr. S. Kofmann, Odessa. *Archiv für Orth.*, i. 1.

This is the hundredth case in the literature. The patient, a girl of sixteen, first noticed slight contractions on the right side of the neck, which grew more marked, and at the time of the first examination kept up all day. At times they were severe enough to prevent eating and sleeping. The contractions began as clonic, and finally became tonic. They ceased at night. The right sterno-mastoid had reached to twice its normal size. The patient suffered acutely, and was unable to work.

She had tried sea bathing two summers without effect. The writer tried electricity, massage, large doses of bromides, and fixation in plaster in the order named, all without avail. Finally, he operated, excising 1½ cm. of the spinal accessory nerve. Success was marked. At the end of seven months the patient had complete control over the muscles, and was practically well except for the deformity of the hypertrophied sterno-mastoid muscle, which had in no way lost its strength. According to the statistics of similar operations partial or complete success is met with in the great majority of cases.—*Henry Feiss, Cleveland.*

132. **Surgical Treatment of Localized Spasmodic Affections.** *La Médecine Moderne*, April 22, 1903.

A. Chipault speaks particularly of spasmodic torticollis and contracture of the adductors. Cases are cited to prove his conclusions, which are that in cases of spasmodic torticollis and spasmodic adductions of the thigh that are amenable to surgical treatment all communication between the contracted muscles and the central nervous system should be cut off. The cases detailed show the superiority of this over other methods, especially those of incomplete nerve resection and of tendon cutting. Complete nerve resection merits a consideration that because of diagnostic errors and unjustified beliefs of operators has up to the present been refused.—*Abst. Am. Med.*

PARALYSIS.

133. **Radial Paralysis Treated by Transplantation.** By Allesandrini. *Arch. di Ortop.*, 1903, No. 1.

Extensor paralysis with flexion and pronation contracture in the hand of a child following cerebral paralysis, treated by grafting the flex. carpi upon the extensor communis through the interosseous ligament. Part of it also fastened to the abductor pollicis. Result good after two months.—*Abst. Centr. für Chir.*, 1903, p. 984, *A. H. Freiberg, Cincinnati.*

134. **Amyotrophic Lateral Sclerosis in a Boy of Fifteen with a History of Acute Anterior Poliomyelitis in Infancy.** By Alfred Gordon, M.D., of Philadelphia.

The disease which is known under the name of infantile spinal paralysis, or acute anterior poliomyelitis, we usually consider as one in which the paralysis, the amyotrophy, the secondary deformities, and the arrest of development in the affected limbs are confined to a certain portion of the body, and remain there during the entire period of life.

When the myelitic focus is replaced by a cicatrix, the patient is left with irremediable infirmities, which, however, have no influence upon the duration of life, nor upon the integrity of other portions of the cord. This is the rule. Nevertheless, there are exceptions. We are now in possession of a certain number of facts which prove that the presence of an old myelitic focus, though healed up, is not an indifferent factor for the future of the patient, so far as his spinal cord is concerned. On general principles a *locus minoris resistentiæ* can be a point of departure for new inflammatory processes, either in the old injured place or in the immediate vicinity or at a distance in the same cord. A concussion, circulatory disturbances, infectious diseases, exposure, trauma, are all factors for awakening an old extinguished focus.

That the acute symptoms of anterior poliomyelitis after a long interval of a few or many years may repeat themselves in the portions of the body previously affected is well known, but that the acute poliomyelitis may be followed by other diseases of the cord is a fact not altogether frequent, as the cases on record are comparatively few. Among the spinal diseases following spinal infantile palsy, progressive muscular atrophy is the most frequent. The perusal of the meagre literature on the subject shows that the spinal diseases recorded made their first appearance a great many years after the initial symptoms of anterior poliomyelitis, consequently in adult or in middle life (Dutil, Ballet, Langer, Laehr, Charcot, Hirsh, and others).

The case reported is of a special interest from this point of view. It occurred at a very early age. After a typical onset of infantile palsy at the age of one year, the disease remained typical until the age of eight, when a series of infectious diseases developed. Shortly afterward gradual loss of weight and strength was noticed. Still later two fractures occurred in one of the affected limbs. The two circumstances gave probably an impetus to the old diseased focus, with the result that the same pathologic process spread considerably and involved also the pyramidal tract.

The latter fact makes the case still more unusual, because, if progressive muscular atrophy was reported, amyotrophic lateral sclerosis was reported only in one case, that of Hirsh. The case reported presented *ad vitam* a typical amyotrophic lateral sclerosis. The post-mortem examination showed vast degenerations of the white matter between the cornua, besides the cornua themselves.

Two more points deserve attention. The majority of cases of progressive muscular atrophy present the well-known Aran-Duchenne's type, in which the small muscles of the hands are first affected. That case presents the scapulohumeral type of Vulpian and Déjerine.

The second and last point of importance lies in the fact that the patient sustained two fractures of the right humerus, both in the same place, after a trivial accident. The occurrence of two fractures in a limb affected with an infantile palsy, and the long process of healing (four months), is an indication that there is a defect of solidity dependent evidently upon a disturbed state of nutrition of the bony tissue, probably of the same origin as the muscular atrophy. As a matter of coincidence (perhaps more), the patient presents a large thyroid gland.

That case is, therefore, one of amyotrophic lateral sclerosis with an atrophy of scapulohumeral type developed at a very early age in a patient who presents symptoms of an old acute poliomyelitis.

TENDONS AND MUSCLES.

135. **Tendon Shortening and Lengthening.** By Tilanus. *Nederl. Tijdschr. v. Geneeskund*, No. 7, 1902.

Makes a curved skin incision, avoiding the skin overlying the tendon, in order to prevent adhesion between skin and tendon wounds and thus insuring mobility of the tendon.

A considerable experience has brought him to the conclusion that in severe cases it is best not to operate more than two tendons at one time, as it is easy to go too far. He prefers, should it later seem desirable, to do a second operation.—*Abst. Zeitschr. für orth. Chir.*, xi. 3.

136. **Further Experiences with Silk Tendons.** By Lange. *Muen. med. Woch.*, No. 1, 1902.

The advantage of the periosteal method of tendon transplantation lies in our ability to choose at will the insertion of the new muscle, which will at the same time consist of sound tissue only. This requires, however, that the suture be made under considerable tension. This is very likely to cause necrosis in slender tendons. In place of this Lange interweaves strong silk strands into the proximal tendon end, and fastens this bundle of threads into the periosteum. In this way a great degree of tension can be made without fear. In some instances the artificial tendon has been 20 cm. long. In two cases out of fifty-six the silk afterward came away. As the result of function, the new tendons increase in thickness. This has been demonstrated automatically in a case where the quadriceps tendon had been grafted in this manner two and one-half years before. The new tendon was found to have attained a thickness of 2 to 3 mm., its lower end being continuous with the periosteum of the tibia. The whole tendon presented itself as a bluish, round strand, about the thickness of a lead-pencil, and surrounded by a layer of loose, mobile connective tissue. The silk threads showed no evidence of degeneration or brittleness.

Patients were shown in whom the method had been successfully employed. *Abst. Zeitschr. für orth. Chir.*, xi. 3.

BANDAGES, PLASTER.

137. **On Removable Bandages and the Combination of Plaster and Celluloid in the Bandage Technique.** A. Ritschl, Freiburg. *Archiv. für Orth.*, Bd. I. Heft 1.

Ritschl considers the fundamental principle of the modern treatment of fractures of the lower half of the leg to be: to immobilize the part as early as possible, so as to get a union in the proper position; to diminish the period of rest in bed as much as possible by using a stiff bandage; and to allow freedom of the joint as early as possible, to prevent joint stiffness and tissue atrophy. He advocates the removable type of bandage in these fractures, where absolute rest for a long time would cause injury, because it fixes the joint and yet allows movement to the muscles that otherwise quickly atrophy. It allows some contraction of muscles even when the fracture is not so strongly healed so as to bear the weight of the body. For severe cases, unless something unforeseen occurs, the bandages can usually be removed for the first time for exercise at the end of two weeks; in slight cases, earlier. As consolidation takes place, the bandage can be taken off daily, and massage and electricity sooner or later begun. This shortens the period of treatment, and allows the injured limb to keep a considerable portion of its functions, which otherwise would be lost.

He then describes his method of application of the removable plaster and celluloid bandages. He advocates the use of the removable bandage in fractures of the ankle and diaphysis of lower extremity, in pseudo-arthrosis of lower leg, in reduced luxations of distortions of ankle joint, and in flat foot. He has used it in one case of hysterical club-foot to good advantage. He then describes as well his method of procedure in fractures of the diaphysis of lower extremity. In general, the removable bandage is indicated when it is a question of giving the foot and lower portion of leg the necessary support for walking, if at the same time it appears desirable to lay bare the limb occasionally for the undertaking of treatment that otherwise may be necessary.—*D. Townsend, Boston.*

138. **Apparatus to facilitate the Application of Plaster Jackets during Spinal Hyperextension.** By E. D. Fenner, M.D., New Orleans, La. *Annals of Surgery*, xxxvii. 92.

Fenner describes an apparatus devised by Dr. J. D. Bloom, of the New Orleans Charity Hospital, which he considers superior to other similar appliances with which he is familiar. It consists essentially of two iron frames, padded on the top for the support of the shoulders and pelvis, and a jackscrew with rubber ring pad on the top, to be placed directly under the kyphos. All three parts are connected by two iron bars running through slots in the bases of each, and are adjustable to fit the patient. The patient lies supine upon these three pieces, and corrective pressure is applied by means of the screw. When a sufficient amount of correction has been obtained, a plaster cast is applied. The opening in the cast for the top of the jackscrew is filled in with plaster after the patient has been removed from the apparatus. He claims greater ease of application for the physician, as well as greater comfort for the patient.—*J. T. Rugh, Philadelphia, Pa.*

MISCELLANEOUS.

139. **Some Daily Variations in Height, Weight, and Strength.** By T. A. Storey. *Am. Phys. Ed. Review.*

The author, after numerous observations on the daily variations in height, weight, and strength, concludes that there is during the day a normal average loss in height of about 1.452 cm. In individual cases this loss may be considerably more or less than the average given. The greater part of the loss occurs in the region of the spinal column, the average loss here being 1.342 cm. There appears to be a loss of 1.1 mm. below the trunk. The height lost during the day is more or less completely regained during the night.

There is a normal loss in weight each night. The average loss recorded was nine-tenths of a pound. The normal daily activities increase the loss in weight. The greater the activity, the greater the loss.

There is a considerable variation each day in ability to make efforts of strength. This ability varies from one day to another, and the variation amounts to a considerable number of kilograms in the strength tests.—*A. T. Legg, Boston.*

140. **New Contribution to the Physiology of Tendon Reflexes.** By A. E. Stcherbak, Warschau. *Central Publication for Neurology*, 1903, No. 5.

By aid of a large-sized tuning-fork which had been set in motion by electromagnetism the author succeeded in producing spastic phenomena in rabbits. The investigations were made on the knee joint. Here an increase in the knee reflex, knee clonus, on percussion and passive movements, and spastic vibration corresponding to the "primary charge" of a different intensity and extension, could be demonstrated. In consequence of a vibration of the vertebral column in the lower dorsal region a series of spastic states became noticeable in all the muscle groups of the hind legs.

The experiments according to the author seem to make it probable that by the aid of vibration we may be able to change the reflex apparatus, as it were, with nerve energy, and may bring about their discharge by the aid of passive movements or continued immobility of the animal.—*Abst. Archiv für Orth.*, i. 2.

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The American Journal *of* Orthopedic Surgery

I.

A UNIQUE CASE OF CONGENITAL LUXATION OF THE ANKLE.

ALBERT H. FREIBERG, M.D., CINCINNATI, OHIO.

In all of the reported cases which I have been able to find, congenital luxation of the ankle has been associated with defect of the fibula. These cases have been divided by Hoffa into two classes. In the one the defect of the fibula has been associated with angular deformity of the tibia and defective development of the foot; in the other the foot has been of normal shape, but the outward deviation of the foot upon the leg has been ascribable to the imperfect development of the external malleolus, depriving the astragalar mortise of its outer part, and to the obliquity of the articular surface of the tibia. The case which is herewith reported belongs in the second class for the reason that the obliquity of the joint line and normal condition of foot and toes are evident. It would appear to be of especial interest, however, because the fibula is present throughout its course, being possibly thicker than normal, and because it seems possible to draw rather definite conclusions from it regarding the etiology of this whole group of cases.

The patient, a girl of twenty-four months, is the daughter of a baker, and was brought by her father to the dispensary of the Medical College of Ohio. The deformity of the left ankle had been noticed from birth; and its correction had been attempted by desultory courses of manipulation and massage,

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but without effect. From the first, attempts at walking were attended with great difficulty, but the child has learned to walk with a peculiar limp. Upon walking a short distance, the child complains of fatigue and finally of pain. There have been no congenital malformations in other members of the family (four other children). The pregnancy and labor of the mother were absolutely uncomplicated. The father acknowledged having had a venereal sore many years ago, for which he was treated and which has been followed by no symptoms of constitutional lues. His other children, according to his statement, have shown no signs of this disease. The mother never miscarried, and all of her children are living.

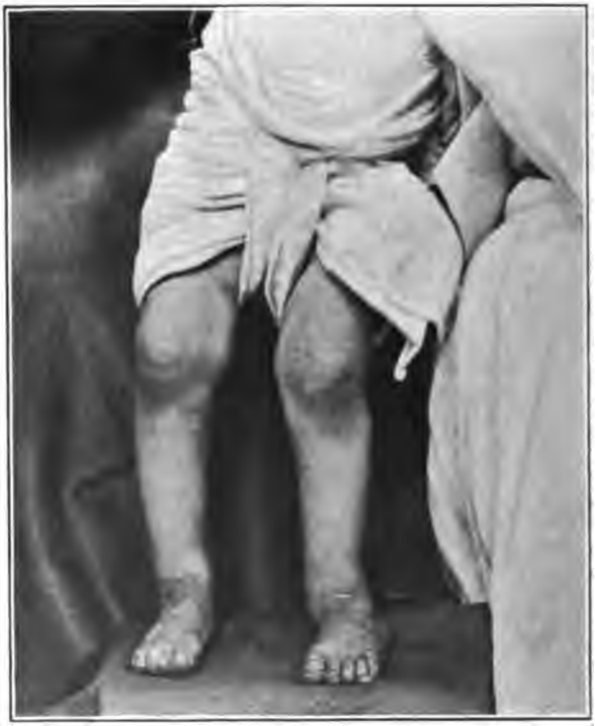

Fig. 1. Congenital dislocation of the ankle.
Used by permission of the "Annals of Surgery."

The child has always been in good health. There have been none of the symptoms of rickets. There is no rosary, and the epiphyses of the other long bones are of normal size. The head is of normal shape. The gait is a peculiar limp, showing great weakness in the left limb; and the pelvis is seen to descend with the application of the left foot. The whole plantar surface is brought into contact with the ground. The photograph shows the outward displacement of the foot upon the leg when weight is borne, but not nearly to the true extent. The child had to be held by the father for the picture, but kept the knees somewhat flexed. The feet are both very flat, but are not everted in walking or standing. Even in recumbency the left foot had its axis in a plane decidedly lateral to that of the leg. The internal malleolus appears prominently, and the external also can be seen. They are both felt to be enlarged, but especially the external, which lies in a plane decidedly above that of the other. Passive motion of the ankle shows the joint line to be oblique from without inwards and downwards. Almost the full normal range of motion is present. The internal contour of the limb is quite straight: the external presents a marked indentation above the ankle. There was no sore or dimple of the skin at this place. The fibula can be felt throughout its length. The feet are of equal size, and present no abnormality of development. The legs are of equal length. The child is otherwise perfectly developed and healthy.

The child was so unruly that the radiograph was made with difficulty. It was, however, sufficiently successful to show the conditions satisfactorily. It is at once seen that the fibula is present in its entire length, but that its shaft is greatly curved inwards, diminishing greatly the width of the interosseous space. The bone appears thick in comparison with the tibia. The diameter of the latter on the radiograph is 12.0 mm. at the middle, while that of the fibula is 8.0 mm. at a corresponding point. It is in the ankle joint, however, that the most interesting condition is found. Instead of being distinctly lower than the inferior tibial epiphysis, that of the fibula is higher. The joint line is at an angle of 75° with the axis of the leg, slanting from without inwards and downwards. On the

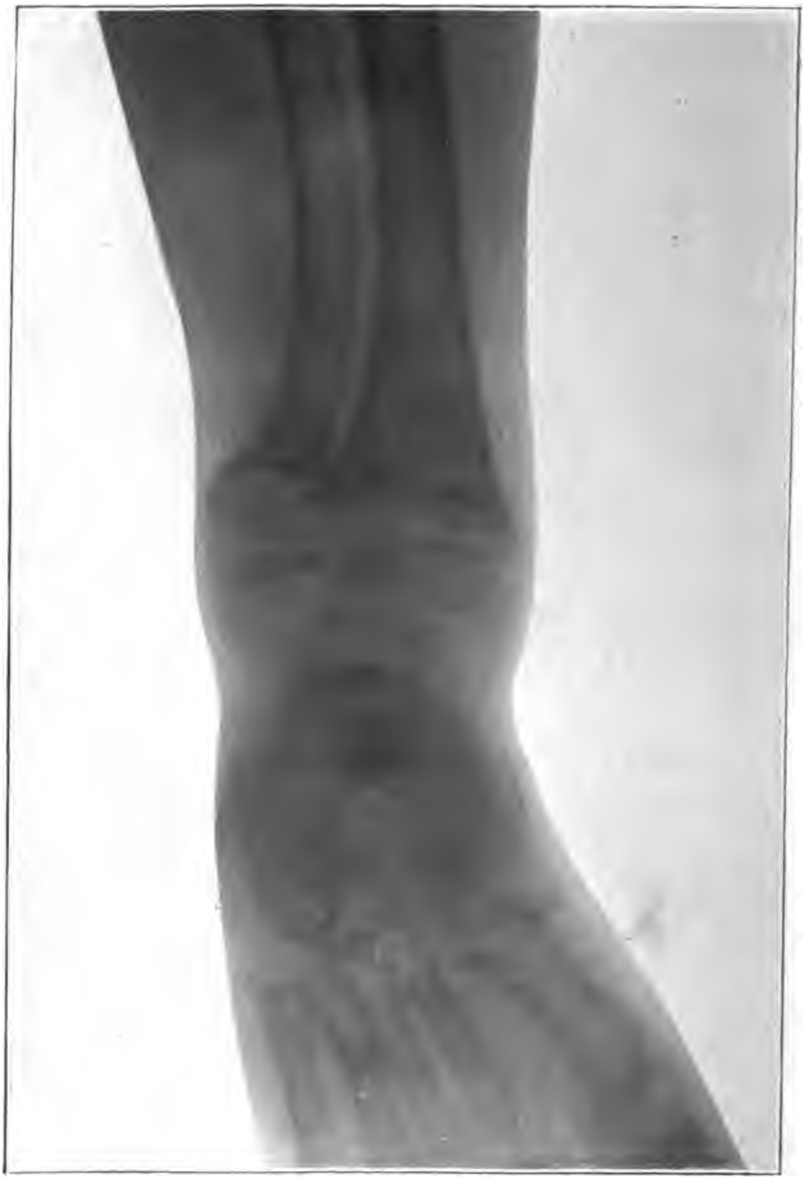

Fig. 2. Congenital dislocation of the ankle.
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tracing made over the negative, therefore representing the limb in recumbency, the axis of the leg falls to the inner side of the astragalus altogether. It appears to me perfectly justifiable, on this account, to consider this a congenital dislocation of the ankle joint.

It was proposed to do osteotomy of the fibula in the hope of bringing down the external malleolus, with possibly the same operation upon the tibia in order to correct the obliquity of the joint line. All operative interference was, however, declined; and the child disappeared from view.

As far as I have been able to ascertain, the case is unique, and its practical interest is therefore not great. In endeavoring to account for its production, it appeared to me to stand in an interesting etiological relation to the cases of defective fibula. The most commonly accepted view of their causation is that of Sperling,* which assumes the pressure of a too narrow amnion early in the embryonal period. In the present instance it would appear that the curvature of the fibula must have been produced by some such pressure,—pressure great enough to simply bend the developing fibula, but not enough to interfere with its further development. Whether the joint line was oblique at birth it is impossible to say. This may have developed in consequence of the abnormal function of the joint during the second year of life. The same may be said of the thickness of the fibula. In weight-bearing the astragalus was under the lower fibular epiphysis, and it is therefore probable that the fibula transmitted considerable stress to the foot.

In all of its physical characters, it seems to me, this case would correspond to an incomplete form of the so-called "Volkmann's Congenital Ankle Deformity," in so far as the fibula has its bony structure intact.† It is furthermore almost self-evident to me that the curvature of the fibula against the straight tibia could have been brought about only by pressure upon it against the tibia. In this far, this case seems to corroborate the theory of amniotic pressure in the production of defective fibulæ and the deformities thereupon consequent.

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* Sperling, *Zeitschr. f. Geburtsh. u. Gynäkol.*, 1892.

† Haudek, *Zeitschr. f. orth. Chir.*, Bd. LV. p. 338.

II.

A PRELIMINARY STUDY OF FUNNEL-FRONT.

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That the deformity known as Funnel-breast is not so rare an affection as is usually supposed, I am very well satisfied.

This affection, which is now usually known as Funnel-breast of Ebstein, and which has since been called Funnel-chest by some one, whose name I do not now remember, has been recognized and described by a number of writers, particularly in England as well as in Germany, long before Ebstein wrote on the subject. His articles perhaps attracted more attention than any of the preceding articles; and he was the first, so far as I am able to learn, to give a particular name to the deformity. Others had written on the subject, describing the condition as a rare deformity of the breast-basket, and also under other names, all of which I think are more or less incorrect. It is hard to give the condition a name that will correctly describe it.

But "deformity of the breast-basket," or "funnel-breast," or "funnel-chest," which Professor O. L. Schmidt, of Chicago, in a letter to me on the subject says he thinks is more correct, all fail to more than partially describe the location of the deformity at the point where it is usually described as existing, although the range of location has been extended to take in much more than it seems was at first intended when the name "funnel-breast" was first given to the condition.

This, I think, is right; for funnel-breast, if this name be adopted for the deformity, or funnel-front,—which I shall propose as broader and allowing other portions of the anterior surface of the body to be included where a depression exists,—takes in more than the breast of the one affected.

The funnel-breast of Ebstein was supposed to describe a depression including the lower end of the sternum, or xiphoid cartilage, and the upper portion of the anterior abdominal wall lying between the cartilages of the lower ribs; but in the descriptions of the cases which I have found described under this head there are some which include much more than what is embraced in the boundaries which I have mentioned. This being the case, the name "funnel-front," although hardly making the location definite enough, has seemed to me to be more nearly correct, because, besides including the anterior chest walls, or any portion of them that might show a depression of this character, it also includes the anterior abdominal wall, which forms a large part of the funnel as described under the term "funnel-breast."

It seems that Ebstein in 1882 first called general attention to this deformity; and Dr. Hermann Goesche in 1895, in an Inaugural Dissertation, gives a very exhaustive review of what he supposes to be all the cases—twenty-four in number—which have been published up to that time, to which he adds the history of six others, and to him I am indebted for the information in regard to these cases which would have been otherwise inaccessible. His cases, however, only cover those mentioned in the French and German literature, while a number of cases published in the English language are not mentioned. Such of these cases as I have been able to find I shall briefly mention; for the description corresponds to those described by Ebstein and other German writers, and the condition is attributed to the same causes which some of the German writers have mentioned.

Just here I may say that I doubt the correctness of the conclusions as the cause in most of the cases I have seen mentioned by different authors.

In order that we may study the different theories of cause of this deformity, I shall briefly mention a number of cases reported by the French and German writers, and for this purpose shall have to draw my information from Dr. Goesche's thesis, and then shall refer to those cases described by English authors and some in this country, as well as four cases of my own which I shall very briefly mention, leaving a more complete description for some future time when I shall have photographs and, if possible, skiagraphs.

Nearly fifty years before Ebstein's paper Dr. John A. Ingels, of Paris, Ky., in a paper published in the *Transylvania Journal*, vol. vii., 1834, pp. 488–492, describes a case which, I think, might be truly called a *double* funnel-breast.

A negro child belonging to Dr. Robert Taliaferro showed at birth a slight deformity. This increased until at the age of eighteen months the child died, death seeming to take place from suffocation. A post-mortem was held which the doctor describes in the following words:—

> The peculiarity of the case consisted mainly in an apparent effort on the part of nature to separate the cavity of the chest into two apartments, an anterior and a posterior. This was measurably accomplished by a very extensive incurvation of the nine or ten *superior* ribs on each side, so that at the distance of about one-third of their length from the sternal ends (the point of greatest indentation) their internal surfaces were very considerably approximated. But the division was rendered much more complete by large cartilaginous tubercles of a semi-spherical form, one of which was based upon the point of the internal convexity of each curved rib.
>
> These tubercles were ranged in vertical rows, one on each side, and equi-distant from the sternum.
>
> They presented a singular and beautiful appearance; and, when discovered, the case assumed a new and more interesting character.
>
> The heart presented itself immediately to view when the sternum was elevated. It occupied the anterior chamber to the exclusion of the lungs. These, being thrown into the posterior, were not brought into view until the heart was partially removed and the approximated ribs forced wider apart.

In 1840, in an article published in the London *Lancet*, vol. ii. pp. 44–46, George A. Rees, M.R.C.S., mentions a case with depression on sides of sternum, as described in his article in the *Medical Gazette* of Jan. 12, 1839, and shown to the London Medical Society Feb. 12, 1839.

While mentioning faulty positions in holding the child and compression of the chest, he believes that the cause of the deformity is disease of the lungs, not allowing expansion. He writes of the same subject in the *Lancet* in 1847, and again in 1850.

In 1857 Dr. Glover in London *Lancet*, vol. i. p. 263, mentions the case of a male eighteen years old, with great depression or absence of the ensiform cartilage. This depression was first noticed to begin when thirteen or fourteen years of age, gradually increasing.

He is an imbecile, but not altogether without intellect. He has no pain and no other abnormality except some lateral curvature. No cause is known.

In 1872 Dr. C. Theodore Williams in the Transactions of the Pathological Society of London, vol. xxiii. pp. 50–52, describes the case of a patient, age seventeen, as follows:—

> On examination I found the chest remarkably distorted, the lower half of the sternum and the adjoining cartilages being so depressed as to form a hole an inch and a quarter in depth, and large enough to contain the greater part of one's fist.
>
> The depression begins at the level of the third costo-sternal articulation, and ends with the ensiform cartilage.
>
> The chest is generally somewhat flattened and the shoulders thrown forward, and there is slight lateral curvature to the right.
>
> Antero-posterior measurement:—
>
> | | |
> |---|---|
> | At level of mammæ . . . . | 6½ inches. |
> | At ensiform cartilage . . . . | 4½ " |
>
> Mother, father, and one brother had same hole in their chests. No others affected. This case was born with the depression, but at two years had whooping-cough, and since that time the depression has increased, and his breathing is interfered with.

During the discussion of this case Dr. C. J. B. Williams mentioned the case of a captain in the navy with a depression of the sternum so deep that it held a pint of water as he lay on his back.

At advanced age he suffered from increasing embarrassment in breathing and circulation, and ultimately became dropsical from this cause.

In 1886 Mr. B. Blower in the Liverpool *Medico-Chirurgical Journal*, vol. vi. p. 470, describes the case of a male, age twenty-one, as follows:—

Approximation of anterior and posterior chest walls in the middle line. The second piece of the sternum is bent at an angle about the centre, apex of angle pointing backwards, forming cup-shaped depression holding ten ounces when lying on his back. There is a lateral and an antero-posterior curvature forwards of the spine.

Antero-posterior dimensions about three inches. Antero-posterior and median mediastina must be almost, if not entirely, obliterated. I have no doubt that rickets was the original cause of this deformity.

In 1892 Professor Dr. M. Bernhardt, in *Deutsch. Arch. f. klin. Med.*, vol. xlix. p. 604, mentions a case of depression at xiphoid. In 1889 Professor O. L. Schmidt, in a paper read before the Chicago Medical Society and published in *Medicine* in May, 1895, p. 79, describes a case of funnel-breast in a man thirty years old. This man, up to the age of twenty-two, had never been sick, but now begins to suffer with marked general weakness and pains in the chest, particularly in the back. After about one year a cough shows itself. This condition continues for two years, gradually getting worse. During this time the attention is attracted to a gradual sinking in of the lower end of the breast-bone. After six years he has grown so much worse that he is entirely disabled. By this time the depression has reached a depth of 5½ centimetres, is to the right of the mesial line, and is accompanied by considerable irregularity of each lateral half of the thorax. There is a well-marked scoliosis.

In both lungs there are inflammatory conditions of the bronchi, and in the lower posterior part of the right lung there is a large cavity.

The existence of a bronchiectasis with a large cavity is established.

Dr. Schmidt excludes this as a possible cause, and seems to incline to the belief that the deformity may be due to an osteomalacial weakening of the bony and cartilaginous frame of the chest; and, as the lower end of the sternum moves, he believes that the end of the bone is fixed by some possible adhesions or that the fasciculus of diaphragm attached to it produced this action. This may possibly have played an important part in the formation of the depression after the sternum began to weaken.

These with the cases reviewed by Dr. Goesche and one or two others to which I do not now have access are all that I have been able to find on record; and the causes assigned for the condition, where any cause is mentioned, are almost as numerous as the cases.

I shall now briefly look at the causes mentioned by the authors and reviewed in Dr. Goesche's paper, and then after a very brief mention of my own cases will compare the causes assigned, and see if we can reasonably accept any of them.

Without attempting to review each case reported, I shall briefly mention those cases in which there were points of interest besides the funnel-breast.

Eggel in his case says it cannot with certainty be shown that there was rickets.

Fliesch reports a case at age of fourteen in which there was a high breast at first, and afterwards developed funnel-breast and scoliosis.

Zukerkandl reports a case which, besides funnel-breast, has a kyphosis.

Ebstein reports a case which in second year had inflammation of brain, since which a paralysis of both limbs exists, and both are atrophied and both have contraction of knee. The left limb is in position of equino-varus, and the right in that of valgus. The second and third toes of both feet have disappeared, and he has also a right-handed scoliosis.

Graeffner reports the case of a man eighteen years old whose mother states that during the last months of pregnancy she slipped and fell, striking the abdomen on a sharp-edged milestone with great force. Several days after delivery of the child she noticed in the cardiac region a striking deepening of the breast wall. With advancing growth the dimensions of this depression have constantly increased. The right side of the breast lags behind in respiration. The vertebral column runs spirally.

Muhlhauser reports a case in a male forty-two years old.

In third year had rickets. The breast-bone with the ribs and collar-bones look as if they were pressed in by force in the form of a funnel, so that the outer dimensions from the breast-bone to the spinous processes amounts to only three inches.

Kündmuller reports a case in a boy eleven years old. A small depression might have existed at birth. The vertebral column is scoliotic, and on both sides there is a genu valgum.

He also reports a case of a man nineteen years old with funnel-breast and dorsal scoliosis, whose father also has funnel-breast.

Vetlesen reports a case in a boy seven years old, who was born asphyxiated, on account of which the midwife used pressure for a considerable time over the chest wall.

Klemperer reports the case of two brothers, ages nineteen and twenty-three, whose mother, grandmother, and great-grandmother were all afflicted with this malformation.

These brothers possess peculiarly formed crania, with flat, short foreheads.

Grünenthal reports a case of a girl of seventeen years with depression that was noticed immediately after birth, and who also has scoliosis. The left arm and leg are weak and atrophied and shorter than the right. He also reports the case of a girl seventeen years old, a cousin of the last mentioned, who has three sisters with malformations, and one brother had funnel-breast. The right extremities are weak and atrophied, and have not developed as the left have. She has a kyphosis, and also a scoliosis with double club-feet.

He reports the case of a sister of the above who has funnel-breast and scoliosis with weak, hyperextended joints.

Dr. Goesche reports some other cases of funnel-breast with associated deformities. I shall now describe my own cases as briefly as possible.

Case 1.—An eighteen-year-old girl has a depression of the ensiform cartilage and surrounding tissues, and, so far as I can learn, it is congenital; but it was not noticed, I think, until I was examining her for a slight scoliosis which has developed in the last two or three years. A younger sister has a considerable lumbar scoliosis.

Case 2.—A boy nine years old has a marked depression of the ensiform cartilage, amounting to about 5 centimetres in depth. Six other children in the same family, also the father and mother, are healthy. Up to the age of four years this boy was well and strong. At this time he had rheumatism, and after this the depression began to show, and has increased until now it is quite large. The abdominal walls are flabby, allowing the abdomen to protrude markedly. His feet are in the condition of slight valgus.

Case 3.—A two-year-old child has a depression to the left of the sternum, just over the apex of the heart. This is about the size of a half-egg, split lengthwise. She also has a right-sided congenital dislocation of the hip.

Case 4.—A five-year-old boy has a similar depression to the last one described, but has no other malformation.

Whether these last two cases should be included as examples of funnel-front is a question; and still I think they may, as the location of this trouble is not always just the same.

Now as to the cause, I can only mention a number, and pass them hurriedly. Atmospheric pressure, which has been mentioned as one cause, I do not believe has any influence whatever in producing this deformity.

A fall on a mile-stone, as mentioned in one case, I think, is an impossible cause; for I do not believe a child is ever in a hyperextended position *in utero,* with the chest wall pressing against the anterior abdominal wall of the mother, to receive a blow of this kind. Neither do I believe that prolonged pressure to resuscitate an asphyxiated child would produce any such condition. Neither do I believe that a fall in an epileptic attack would produce it.

That intrauterine pressure may account for some congenital cases such as these last two I have mentioned, I think is possible, as I believe it may account for some such conditions as congenital scoliosis. This may be caused by lack of amniotic fluid and too limited motion of the limbs.

The mother of the last boy mentioned tells me she was very small during her pregnancy and had very little water.

That a local arthritis deformans might follow an attack of rheumatism and produce a condition of this kind might be possible. But these are merely suggestions.

In acquired cases I believe the suggestion of Dr. Schmidt in regard to his case, that it might be due to an osteomalacia, is very likely correct. And that this same disease may manifest itself locally, and produce this deformity even in children, I believe is possible; for, while osteomalacia is a disease usually of adult life, we do have an infantile osteomalacia as well as the same disease *in utero*.

This or rickets, I believe, is the most plausible solution of the cause. Added to this, we may have a partial paralysis of the abdominal muscles, as we do of the leg muscles in cases of congenital club-foot and of the back muscles in scoliosis. It seems to me the strong contraction of that portion of the diaphragm attached to the lower end of the sternum, together with the triangularis sterni drawing the lower end of the sternum backwards with a relaxed condition of the recti, might encourage a depression of this kind, which, once begun, would naturally increase.

This might be a cause for either congenital or acquired funnel-front; but it is only a suggestion, for we must admit that as yet no very satisfactory or certain cause has been found.

III.

REPORT OF A CASE OF UNUSUAL CONGENITAL MULTIPLE DEFORMITIES.

B. E. M'KENZIE, B.A., M.D., AND H. P. H. GALLOWAY, M.D.,
TORONTO.

The patient, F. L., aged twenty years, whose photograph is shown in Figs. 1 and 2, was first examined about Jan. 1, 1900. The combination of congenital deformities which he presented was very unusual, if not unique; and this, together with the fact that the result of treatment was highly satisfactory, makes it seem desirable to place the case on record.

The examination disclosed the following facts. There was congenital *anterior* dislocation of both hips. The right foot was an extreme example of talipes equino-varus. The left foot was greatly supinated and slightly in the equinus position. The left knee presented a combination of extreme knock-knee and genu recurvatum, so that it presented a salient angle looking backward and inward. Further, when the right knee was flexed, it bent laterally instead of antero-posteriorly, and the patella was at the outer side of the limb instead of in front, this being due to the outward rotation of the femur caused by the anterior dislocation.

One would suppose that a patient the mechanism of whose lower extremities was so much out of gear would be almost incapable of locomotion; but, far from this being the case, he was fairly active on his feet, and used neither cane nor crutches. We had frequently seen him on the street during several years before he was brought for examination, and had personally observed him playing ball with other boys, and appearing to enjoy the game. His mode of locomotion was, of course, exceedingly awkward in appearance, enough so to be really painful to the lay observer; and the distortion was sufficiently hideous to affect unpleasantly persons of a sensitive temperament who met him casually on the street. As he approached adult life, the humiliating nature of his condition made him anxious to secure relief; and he very willingly accepted the proposition that an improvement of his condition by surgical means be attempted. He was admitted to the Toronto Orthopedic Hospital, and on Jan. 12, 1900, the first operation was performed. This consisted of subcutaneous section of the plantar fascia and of the tibialis anticus of the right foot, and of the plantar fascia, tibialis posticus, and the internal lateral ligament of the left foot, followed by forcible wrenching. The feet were then dressed in plaster of Paris in a greatly improved position. Eleven days later the left knee joint was excised, section of the bones being made in such planes that, when brought together, the outward rotation of the foot was corrected and the leg and thigh were in a straight line with the

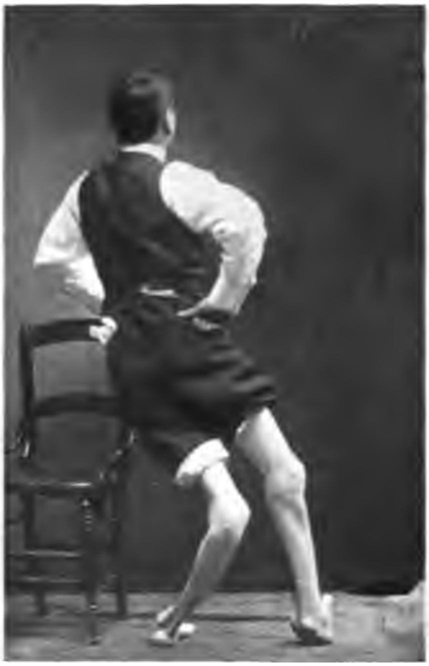

FIG. 1.

exception of about ten degrees of antero-posterior flexion at the level of the knee. At intervals of from three to six weeks the feet were forcibly manipulated under anæsthesia, the position being improved each time till the deformity was practically fully corrected. The varus and supination were over-corrected before making any attempt to correct the equinus, then by tenotomy of the tendo Achillis, followed by forcible manipulation, the equinus was overcome. After several months had elapsed the patient's condition had been improved to a very gratifying extent; but locomotion was considerably impeded by the impossibility of flexing the right knee antero-posteriorly, to which reference has already been made. To remedy this, a final operation, osteotomy of the right femur, was undertaken on July 19, six months from the time he first entered the hospital.

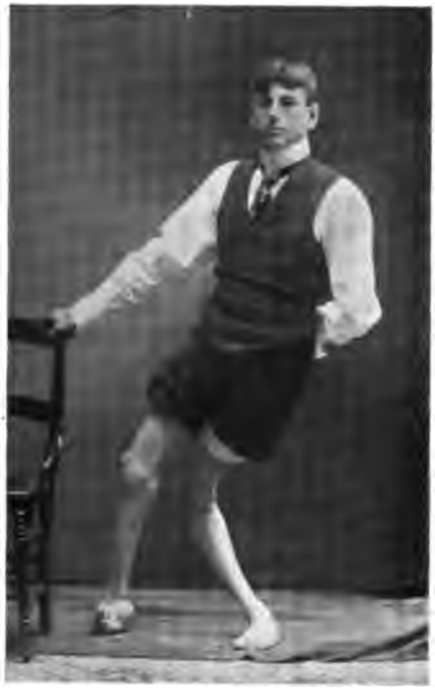

FIG. 2.

The shaft of the femur was cut through with a chisel at the junction of the middle with the lower third. The lower fragment was then rotated inward sufficiently to bring the patella in front, and in this position the limb was dressed in plaster of Paris. Sound union occurred in about two months, and antero-posterior flexion of the knee was then possible (Fig. 3). In all the patient was anæsthetized eight times. The improvement in his appearance will be best appreciated by reference to the photograph reproduced in Fig. 3. He is earning his living as a clerk in a life insurance office, does not use even a cane; and, while locomotion is somewhat stiff and ungraceful, he can walk a distance of a mile or two without discomfort.

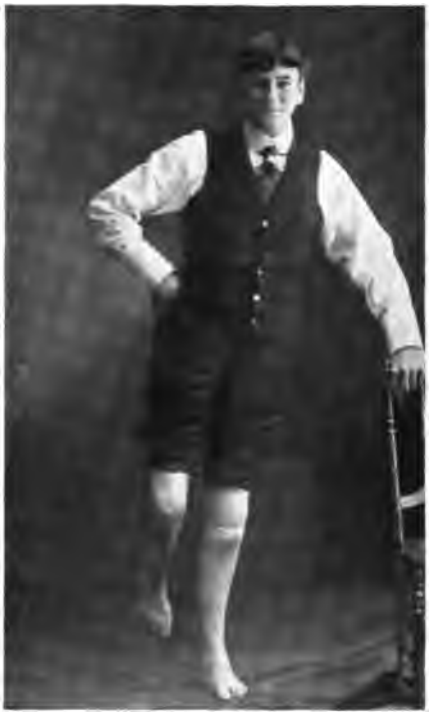

FIG. 3.

IV.

THE ELEMENT OF TORSION IN LATERAL CURVATURE OF THE SPINE: ITS PLACE IN THE CAUSE AND TREATMENT.

(*Third Paper.*)

ROBERT W. LOVETT, M.D., BOSTON.

In spite of the present activity in orthopedic literature on the subject of rotary lateral curvature of the spine, our present knowledge of the mechanics of the affection is very inexact, and treatment for this reason is necessarily largely empirical. The explanations of the phenomena of scoliosis and the study of its mechanism have been written from a study of the especial structure of the human spine, particularly the distorted scoliotic spine. The curves of the articular processes have been studied, the shape of the individual vertebræ has been analyzed, the physiological curves have been considered, and a large amount of work has been expended* upon this side of the question. This literature occupies a large space, but has proved of little practical value.

The present paper is an attempt to study the element of torsion in its relation to lateral curvature,—a study not of the anatomy, but of the movements of the spine.

The anatomical work was done at the Harvard Medical School, and the writer is indebted to Professor Thomas Dwight of the Harvard Medical School for his anatomical material and for the benefit of his criticism, to Professor I. N. Hollis of Harvard College for help on the mechanics of the problem, and to Dr. Henry Feiss of Cleveland for much help in the experimental part of the work.

If one considers the human spine from the point of view of

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* Riedinger, "Morphologie und Mechanismus der Skoliose," Wiesbaden, 1901.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

its evolution, one finds that the spinal column in its simplest form (Cyclostomata) consists of a homogeneous non-segmented flexible rod. The articular processes first appear in some of the fishes (Rays and Teleostei), and are general in the Amphibia (Gegenbauer).

The spinal column in the lower fishes is a simple flexible rod consisting of a series of disc-like vertebræ bound together by intervertebral elastic discs without articular processes. Higher in the vertebrate group one finds elaboration of structure and the formation of permanent antero-posterior ("physiological") curves, along with modifications of the shape of the vertebræ. But articular processes seem to have developed in the line of incidents rather than essentials, and in the higher forms to have carried out rather than radically modified the behavior of the simple fish's backbone, which is in mechanical terms a straight, flexible rod.

Articular processes in the human spine from the point of view of their evolution are therefore to be regarded as the resultants of use rather than as factors determining of themselves the motions of the spine. They are the result rather than the cause of the behavior of the spine.

The questions at issue are these:—

(1) Why does rotation of the spine on its vertical axis occur in lateral curvature?

(2) If lateral curvature is necessarily associated with rotation or torsion, may not the reverse be true, and may not rotation of the spine be necessarily accompanied by lateral curvature?

On theoretical grounds Meyer came to the conclusion in 1865* that the articular processes were not the cause of torsion, but that torsion was due to the fact that the human spine was composed of two elements,—the column of bodies and the column of arches,—and that, as the two columns possessed a different degree of elasticity, side bending must result in a torsion, since these two elements of the column did not respond in the same degree to side bendings. Since Meyer's view after long years

* Meyer, *Virch. Archiv*, 1865, Bd. 35.

of neglect has again come to the front,* it becomes of importance to examine the following aspects of the question:—

(*a*) Do the articular processes determine or cause torsion of the spine?

(*b*) Is torsion caused by the fact that the spine consists of two elements of different elasticity?

(*c*) Does the spine as a whole behave as would a flexible rod of the same size and shape independently of the two factors mentioned above, and may not torsion be explained by this fact alone?

In order to determine whether the articular processes cause torsion, and whether the united action of the two components of the human spine, the bodies and the arches, is necessary to produce torsion of the human spine in side bending, the following experiment was made:—

The column of vertebral bodies was removed from an adult cadaver by cutting the pedicles of each vertebra, and the column of vertebral bodies was observed by itself. In all respects it behaved as does the intact spine with ribs attached. Rotations and twistings followed the same formulæ as in the flexible rod and also the same formulæ as in the intact human spine. Even the lack of torsion movement in the lumbar spine, supposed to be due to the close interlocking of the articular processes, existed in the column of bodies, entirely independent of articular processes.

This demonstrated that neither the articular processes nor the different elasticity of the bodies and arches was necessary for the production of torsion in side bending, but that such torsion occurred in the column of vertebral bodies alone, and that the column of vertebral bodies alone did not differ in its behavior from that of the intact human spine.

Since, then, the whole spine behaves as would the column of bodies alone, and since the history of the spine in its evolution is that of a flexible rod increasing in complexity of structure, an investigation was then commenced to see if the spine in its movements did not behave as would any flexible rod of similar size, shape, and elasticity. If such is the case, it would obey the laws of physics governing flexible rods; and as a passive instrument under certain conditions it must assume certain positions, and could not assume others so long as its structure was intact, just as a carriage will go backward or forward or may be turned to the right or left, but will not go up or down or sideways. It does not matter whether the carriage is pushed or pulled or goes of its own motive power, there are certain things that it can be made to do and others that it cannot be made to do, so long as its structure and equilibrium are intact. And, however much one carriage may differ in details from others, it is like every other so far as obeying certain general laws of physics. In the same way, spines may be grouped together in obeying certain physical laws, however much they may differ in detail.

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* Albert, "Die Mechanismus der skoliotischen Wirbelsaüle," Wien, 1899; Riedinger, "Morphologie und Mechanismus der Skoliose," Wiesbaden, 1901.

A flexible rod—as, for example, a quadrilateral rod of rubber—in bending or twisting follows certain definite mechanical laws; and these laws can be formulated in advance by any one familiar with mechanics. A straight flexible rod can be bent in one plane without twisting; but if such a rod, originally curved in one plane, be bent in another, it must twist. It must always do this, and can do nothing else. When the top is bent forward and to the right while the lower end is held, the front turns to the left, and always to the left. A fixed combination of twisting and side bending exists for every position.

From a mechanical point of view a pure twist may be produced in a straight flexible rod without causing side displacement. There is a turning of each part of this rod in the horizontal plane, which is spoken of mechanically as *shear*, but no bending of the rod as a whole appears. But let this rod be bent already in the antero-posterior plane, and torsion of such a rod inevitably causes side displacement when viewed in the antero-posterior plane.

This was demonstrated by experiment in a quadrilateral rod of sponge rubber one inch square and eight inches long and in a quadrilateral rod of lead thirty inches long. In the latter series of experiments the lower end of the rod was fixed in a vise and the twist given by a monkey wrench at the free upper end. In both series of experiments a twist to the left was followed by one curve, and a twist to the right by the opposite curve. These results were constant in both series of experiments.

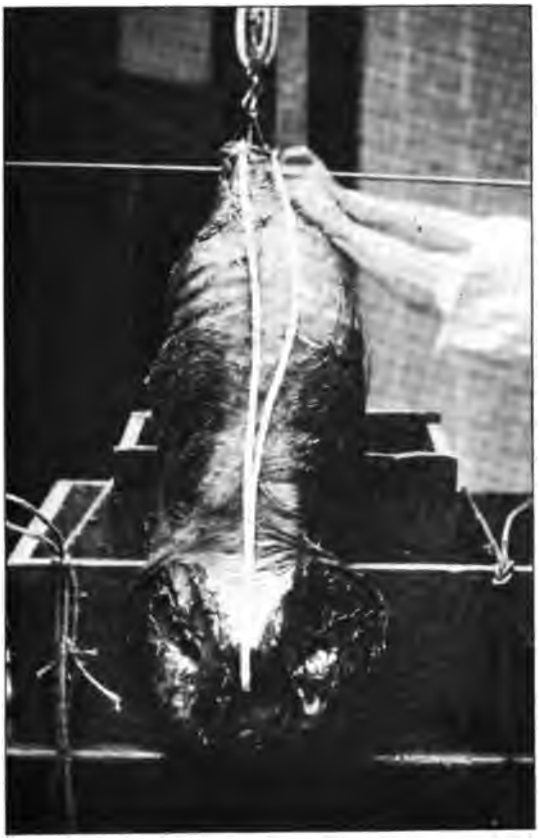

FIG. 1. COMPOSITE PHOTOGRAPH OF CADAVER.

Straight and twisted to left. The white line is a strip of cotton cloth nailed to the spinous processes. The straight white line was before twisting: the curved white line to the right is the twisted position.

The following experiments were undertaken on the human spine:—

The spine of an adult of about forty and the spine of the cadaver of a boy eighteen years old were observed. The pelvis was firmly fastened to a box and the cervical region twisted to the right and left by the hands and by a long brass rod fastened to the third dorsal vertebra. A lateral curve always accompanied the twisting, and occurred always to the left when the twisting was to the right, and to the right when the twisting was to the left. The curve was to the same side, and followed the same rules as that observed in the lead and rubber rods.

Observations were then made on the living model. The model was a woman of twenty-five, a professional model, who was very flexible. With the pelvis fixed, active or passive twisting with the chin to the left produced a marked lateral curve to the right, with side displacement of the body to the right. Twisting to the right produced the opposite curve. The curves were of the same character and followed the same rules as those observed in the lead and rubber rods and the spine of the cadaver. In twisting with the chin to the left, the lateral curve begins at the dorso-lumbar junction and sweeps gradually out, returning in the cervical region to practically the median line. The lumbar region apparently takes little part in the lateral curve, It appeared at first as if there were a slight left lumbar curve accompanying this right dorsal curve, but careful observation and measurement on the cadaver and model showed that there was but little, if any, lumbar lateral curve. There is but little movement of torsion in the lumbar vertebræ normally, so that in spines comparatively normal it can be readily seen that any phenomena of torsion would be shown above rather than in this section of the spine.

Torsion may be carried to a much greater degree in both model and cadaver when the spine is erect than when it is fully flexed. In the erect position 90° of rotation of the top of the column was possible in both, while in the flexed position only 45° was allowed. When twisting is done in the position of full flexion of the spine, the lateral curve is located higher up than when it is done in the simple erect position; and its lower limit begins at about the seventh or eighth dorsal vertebra instead of at the dorso-lumbar junction.

The backbone of a fish and the backbone of a cat when placed in corresponding positions behave in the same way as the rubber and lead rods, the living model and the human spine and lateral bendings and torsion preserve the same relations to each other.

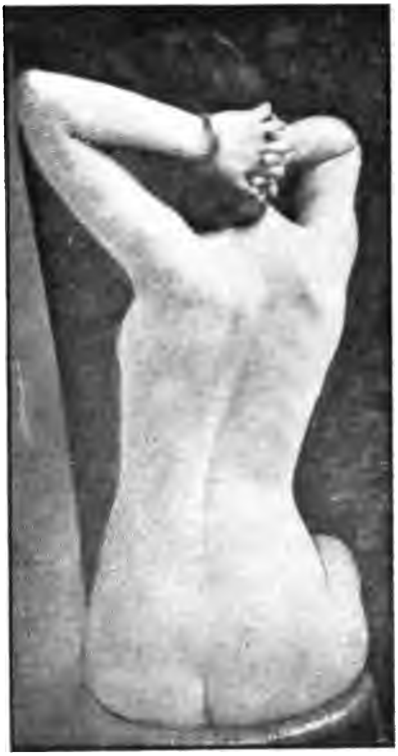

FIG. 2.—MODEL TWISTING TO LEFT.

Illustration from former paper.

The result, then, of these observations is as follows:—

(1) An active or passive twist with the chin to the left in model and cadaver is accompanied by a dorsal curve to the right with displacement of the trunk to the right. In the erect position this lateral curve begins at the dorso-lumbar junction. In marked flexion the lateral curve begins at the seventh or eighth dorsal vertebra.

(2) An active or passive twist with the chin to the right is associated with a left lateral curve and a displacement of the body to the left.

It may be objected that this lateral curve is merely due to the fact that the whole thorax is twisted to one side, and that the dorsal excurvation is thus seen from its side rather than from its posterior aspect, thus giving the appearance of a lateral curve where none exists. Observations on the bodies of the vertebræ in the cadaver twisted in this way showed, however, that there was a displacement of each vertebra on the one below it, making a real curve.

Regarding the human spine, then, as a flexible rod already permanently curved in the antero-posterior plane by the three physiological curves, two propositions follow:—

(*a*) It cannot as a whole or in any part be bent to the side without twisting, as demonstrated in a former paper.*

(*b*) It cannot be twisted or rotated without acquiring a side bending.

It is desired to formulate the last-named phenomenon of twisting or torsion for two reasons:—

(1) To analyze lateral curvature by means of it to see if certain cases do not begin as a twist rather than as a side bending.

(*b*) To utilize twisting movements and manipulations in the treatment of lateral curvature.

In the application of conclusions drawn from such general laws to the treatment of scoliosis, it may be very properly objected that such laws may not apply to the movements of a twisted and stiffened spine. On the other hand, it may be true that the laws governing flexible rods, if properly studied and adapted to the especial conditions existing in such patients, may apply with especial force and may be one lacking factor in the more satisfactory treatment of scoliosis. Experiment alone will determine the fact. In any event no theoretical knowledge gained from the study of a flexible rod can be considered as applying to the human spine without confirmation by experiment on the living model and cadaver. The least objection to the application of such general laws to a specific spinal distortion would be found in beginning scoliosis, the so-called postural cases; but even here experimentation would be required to establish the similarity of behavior.

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* Mechanics of Scoliosis, *Orth. Trans.*, vol. xiii. p. 251.

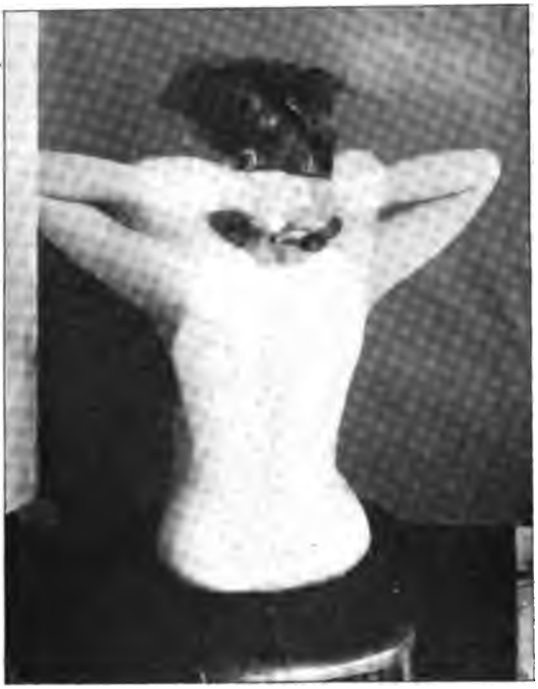

FIG. 3. COMPOSITE PHOTOGRAPH OF MODEL.

Twisting to left.

The application of these facts to the study of scoliosis is of interest. Since every side bending of the spine is necessarily associated with some degree of torsion, one would expect to find that in all cases of lateral curvature of the spine, however slight, the shoulders had twisted in their relation to the pelvis, and that a line connecting two corresponding points in the shoulders was no longer parallel to a similar line in the pelvis. Looking down on a normal person in the erect position, the shoulders would not appear to be twisted with regard to the pelvis. In all cases of lateral curvature observed by the writer, such a twisting has been found. In cases of what appear to be at first sight purely lateral postural curves, beginning scoliosis of the kind where no rotation is supposed to exist, one will find on looking down on the patient standing at ease that the shoulders are noticeably twisted with regard to the pelvis, and that one side of the shoulder girdle is carried forward and the other back. This is particularly noticeable in postural cases after they have been standing for a minute or two and muscular fatigue has commenced. Such patients, if asked to bend forward until their trunk is horizontal (Adam's position), will appear to have no rotation or torsion present, and it will also disappear in recumbency or suspension; but, viewed from above in their natural standing position, it is evident. It may also be demonstrated by placing long pieces of splint wood horizontally against the sacrum and the back of the chest above the spines of the scapulæ. This torsion is the inevitable outcome of every side yielding of the spine. But it is possible that the lateral curvature may have originated in a twist and that the side bending is secondary.

If a child holds the head naturally twisted, as is often the case, from some inequality in the vision of the two eyes or in the acuteness of hearing in the two ears, or from some similar cause, the spine will inevitably be twisted. Again, the contact of the condyles of the occiput and the articular surface of the atlas is generally best when the head is held otherwise than quite straight, which is an established anatomical fact. The twisted position of children at school in consequence of improper school furniture is another factor leading to the acquirement of a twisted position of the spine. These factors all tend to induce a twist of the spine, and a twist of the spine must in all cases be accompanied by a lateral deviation, to the right if the twist is to the left, and a curve to the left if the twist is to the right. This etiological factor has been left largely out of account in considering scoliosis.

Since the association of torsion and side bending of the spine is a constant one, as has been seen in the preceding experiments, it may be worth while to study scoliosis in terms of torsion. That is, to study the obliquity of the shoulders in a given case in the erect position to see whether the right or left shoulder is carried forward, and, knowing then the twist of the shoulder girdle with relation to the pelvis, to see with what lateral curve a right or left twist of the shoulder girdle is associated in the given case. In this way it is possible that some light may be shed on the origin of an individual case of scoliosis, and also possibly upon the general question of rotation.

In a former paper the following conclusions were reached by a series of experiments on the spine of the human cadaver and on the living model:*—

"Lateral bending, then, in both cadaver and model in position of marked flexion is accompanied by torsion, and this torsion is in this position always in one direction, and is of the same type as the rotation seen in scoliosis; that is, backward, on the convexity of the curve, or, in other language, the bodies of the vertebræ turn towards the convexity of the lateral curve. Various attempts were made to reverse this torsion while making side bendings in the flexed position by pulling the vertebræ apart, pressing them together, etc., but in all cases in both cadaver and model the type of torsion described above persisted. . . . In the intact spine of the cadaver, therefore, and in the model, side bending in the extended position is accompanied by torsion of the vertebral bodies toward the concavity of the curve; in other words, the rotation is backward on the concavity of the curve, which is the reverse of the condition ordinarily seen in life in scoliosis."

Proceeding in the light of this to investigate scoliosis, one finds that—

(1) A simple postural curve, if acquired in the flexed position of the spine, will show a twist which may be predicted in advance. In such a curve to the left the left shoulder will be carried back and the right forward, because in such a curve the bodies of the vertebræ turn to the left, as shown in a former paper.

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*Lovett, "Mechanics of Lateral Curvature," *Boston Medical and Surgical Journal*, June 14, 1900.

(2) If it is a curve originating in the extended portion of the spine,—that is, occurring in the lumbar region,—the twist will be reversed, and the right shoulder will be carried back.

That cases of single postural curves commonly show a type of torsion that is the reverse of that seen in double curves has been noted clinically by Schulthess * and others (in one-third of the cases of total scoliosis, Jach.†). That is, in a left total curve the bodies of the vertebræ may turn to the right instead of toward the convexity of the lateral curve, which is to the left. This is explained by the existence of position (2) noted above. This in my experience seems to be the common type of torsion seen in the standing position in cases of total scoliosis of the postural type.

(3) If the curve originates in a twisting of the spine rather than a side bending, the only twist observed that will cause a left curve is with the chin to the right, and therefore the right shoulder is back.

In total left scoliosis, therefore, there are three conditions which make the shoulder girdle assume an obliquity with regard to the pelvis:—

(1) A lateral curve to the left occurring in the flexed position of the spine with the left shoulder back.

(2) A lateral curve to the left occurring in the extended portion of the spine with the right shoulder back.

(3) A lateral curve to the left occurring as the result of a twisting of the spine with the face to the right, in which case the right shoulder is back.

Three reversed conditions exist, of course, for right total curves. If one takes these six conditions and rearranges them in terms of right or left shoulder back, one may construct the following table for the interpretation of simple total curves:—

If the right shoulder is back, it may be due to

(1) Right total curve acquired in flexion.

(2) Left total curve acquired in extension.

(3) Left total curve from twisting to the right.

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* Schulthess, *Zeitschr. f. orth. Chir.*, vol. vi. p. 399; Kirmisson, *Rev. d. Orth.*, vol. vi.; Hess, *Zeitschr. f. orth. Chir.*, vol. vi. p. 556.

† *Zeitschr. f. orth. Chir.*, 1892, 1.

If the left shoulder is back, it may be due to
(1) Left total curve acquired in flexion.
(2) Right total curve acquired in extension.
(3) Right total curve from twisting to the left.

So far as the purely postural cases of lateral curvature are concerned, the twist of the shoulders should be easy to decipher when the relations of torsion and side bending are understood. But in the severer cases of scoliosis, where there are two curves or even three curves, a new and confusing element, that of equilibrium or adjustment, comes in, which seems to have received little attention in the consideration of the mechanics of scoliosis. The element of equilibrium must modify the behavior of the spine, because in addition to being a flexible rod it must be considered a flexible rod with a sense of balance and equilibrium. Not only is there continually an instinctive attempt when in the upright position to keep the head in the middle line of the body over the base of support, but to keep the shoulders parallel to the pelvis and the head looking approximately forward.

Were it not for this instinct of adjustment, one would expect that, as the lateral curve increased, the shoulders would twist more and more in their relation to the pelvis until in extreme cases of lateral curvature they might be twisted to an angle of 45° with the pelvis. Because, starting with a slight lateral curve, there would be a slight twist of the shoulders, and, with more lateral curve, a greater twist; but such is not the case.

In cases of more advanced scoliosis the shoulders are also twisted in regard to the pelvis, but not very much more than in the beginning cases, yet the lateral curve is much greater. To go about with the shoulders twisted 45° out of the lateral plane of the body would be an impossible condition; and, although in a slight lateral curve, the twist of the shoulders might be proportionate to the lateral element of the curve, it could not increase in the proper proportion as the lateral curve increased without resulting in an impossible and disabling condition. Consequently, somewhere between the shoulders and pelvis some compensation has occurred; and the nature and seat of this compensation constitutes one of the most intricate and perplexing problems in the question of lateral curvature.

It would seem as if the twisting on a vertical axis shown in the prominence of the ribs on one side, known as the fixed rotation, in cases of scoliosis were the result of this compensation. The shoulders must be kept roughly parallel to the pelvis and the head looking approximately straight ahead. To accomplish this parallelism of the shoulders and pelvis, compensating twists (rotation) must occur in both lumbar and dorsal region; and they must be of an amount and character to keep so far as possible the top of the column pointing straight ahead. In the severe cases of right dorsal, left lumbar curve the left side will be prominent backward in the lumbar region, the right side backward in the lower dorsal region, but the axis of the shoulders again will be found backward on the left side. The instinctive sense of adjustment in keeping the atlas pointing in the same direction as the last lumbar vertebra is an important matter, demanding compensating twists in a column which has once seriously curved to the side.

Rotation in severe lateral curvature, therefore, may be the result of the patient's instinctive effort to keep the shoulders square with the pelvis. A twist is necessitated by the beginning of every lateral curve, but this twist cannot carry the shoulder plane too far out of the pelvic plane. To get the shoulders back parallel to the pelvis, a compensating twist must be added to the existing twist, and the fixed rotation thus becomes the sum of the two. This is seen when one analyzes by the aid of the scheme furnished the condition where fixed rotation exists. The reading of the scoliosis in the light of the obliquity of the shoulders is not the same as in total curves of postural scoliosis, but apparently the reverse.

Fixed rotation is not, therefore, to be overcome by a simple untwisting, but must be regarded as a compound phenomenon induced by two twists, to be dealt with by local pressure in the usual way.

As to the therapeutic use of torsion of the whole spine, it is to be remembered that in the present treatment side bending and side pressure are practically the only unilateral or non-symmetrical movements used. Wullstein alone seems to have used torsion in forcible correction, but he has used it in connection with strong traction and as an accessory measure rather than to obtain its specific effect. Many complicated free standing movements involving torsion are used, because they seem to place the spine in an improved position; but such movements, when used, are purely empirical, and take but little account of the specific effect of torsion, which has never, so far as I know, been formulated or even studied from this point of view. Side bendings in the gymnastic treatment are of great value; but it must be remembered that side bending as such does not exist, but always carries torsion with it. The trend of modern gymnastic treatment of late years has been toward laying more stress on symmetrical exercises and less on active side bendings.

The application of side force in the forcible correction of scoliosis has the theoretical and well-recognized objection that pressure must be communicated to the spine through the thorax. The ribs are movable at both ends, and a certain amount of force must be expended on the ribs before acting upon the spine. Torsion, on the other hand, acts directly upon the vertebræ. Theoretically, it has this point of advantage.

Torsion to the left with the spine erect causes, from the dorso-lumbar junction upward, a marked right dorsal curve, and the trunk is carried to the right of the median plane. If the spine is flexed before being twisted, the right dorsal curve begins higher up, at the seventh or eighth dorsal vertebra, and has the same character. Torsion to the right causes a left dorsal curve, which may be distributed through the whole dorsal region or located in its upper half, as may be desired.

Moreover, it is by no means clear that many so-called postural cases of early lateral curvature do not have their origin in a twist of the whole spine rather than in a side bending, and that the apparent side bending is only the result of the twist.

For such cases corrective twists would seem to be more rational treatment than corrective side bendings.

The therapeutic application of torsion is therefore plain. A right dorsal curve should twist or be twisted to the right, which should curve the spine to the left. Should it be a high dorsal curve, the twist should be given in full flexion of the spine. So far as the writer's experience goes, the therapeutic problem has been worked out only with regard to cases without fixed curves, where it has seemed to have a proper application and a distinctly good effect. With regard to cases with fixed curves it is not possible as yet to say what is its therapeutic value.

All that can be said at present is that torsion in the normal spine causes a distinct and uniform lateral curve, that postural cases of lateral curvature represent so slight a departure from the normal that rules governing the normal spine may be applied to them, as has been demonstrated experimentally; that postural lateral curves may apparently originate in (*a*) the flexed position of the spine, (*b*) in the extended position of the spine, (*c*) in twisted positions of the spine in which the lateral curve is only symptomatic of the twist; that in these cases torsion movements and passive torsions are of therapeutic value; and that, in general, the normal intact human spine behaves as would any flexible rod of similar curve, shape, and structure.

It is to be hoped that a further knowledge of torsion may enable us better to understand severe cases of scoliosis with fixed curves, and it is not unlikely that torsion movements and forced torsion may be of use in the correction of such cases.

DISCUSSION.

DR. A. B. JUDSON.—I made a statement some years ago to the effect that "a brace is powerless to reduce lateral curvature. Its application is injurious rather than beneficial" (Transactions, vol. ix. p. 205). I should have qualified this by saying that a brace applied to produce antero-posterior pressure would be useful in treatment, although not practically efficient for absolute reduction of the deformity,—an opinion that was especially maintained by our honorary member, Dr. Lee, in 1869 (Transactions of Pennsylvania State Medical Society, 1869, pp. 372–378).

Such an application is called for on the ground that it would transfer weight from a part of the column which swings away from the median plane to a part which is held near the median plane because it is in the wall of the cavity. It is but a repetition of the mechanics involved in the application of pressure in a case of Pott's disease, in which we try to throw the weight on the sound part of the column.

It does not seem to me to be necessary to go further, and to seek a justification of this plan in the action of a column under lateral combined with antero-posterior curving, as I have tried to show in a recent paper on the subject (Transactions, vol. xiv. pp. 273–277). A column which curves antero-posteriorly, and at the same time laterally, may be said not to have two curves, but rather one curve partaking of antero-posterior and lateral qualities,—a simple curve produced by the resultant of two forces, one acting for antero-posterior and the other for lateral curving. Can it be said that this is necessarily attended by rotation, which is motion of an entirely different kind? Is it not simpler to say that this new movement comes from something extrinsic,—viz., the arrest or delay of lateral movement in one part, while another part is free to respond more widely to the curve-producing force? The questions involved are extremely interesting, and invite thoughtful study; and I think we are very much indebted to Dr. Lovett for calling attention to the subject in his usual thorough and painstaking way.

Dr. B. E. McKenzie said that the subject was a most complicated one, and he felt quite incompetent to follow the paper that had been read,—it would require a good deal of time for satisfactory mental digestion. The point just touched upon by Dr. Taylor, and which had been brought out in both of the papers read,—*i.e.*, that the large lateral muscles of the abdomen had the power to produce lateral curvature,—was shown clinically in one very marked case which he had observed. The patient was a healthy, vigorous boy of eleven years, who had been taken ill with what was probably an anterior poliomyelitis. Some physicians had made a diagnosis of pseudo-hypertrophic paralysis, but the subsequent history proved this diagnosis to be incorrect. The paralysis affected very largely the abdominal muscles. Having been perfectly erect in the spine previously, he developed very rapidly the most extreme curvature in the lumbar region that the speaker had ever seen, the vertebræ in this region rotating about 90°, and the lateral masses projecting almost directly backward. The cause in this case could only be the loss of the staying power otherwise provided by the muscles as guys to hold the spine in position. He had understood Dr. Lovett to make certain statements regarding the spine with which he felt obliged to take issue, but on the spur of the moment it would be difficult to formulate objections. He would congratulate Dr. Riely and Dr. Lovett on the apparatus presented. Both of them appeared to be simple in action and powerful. He was in the habit of dividing his work into two parts,—viz., (1) the application of force and (2) the training and educational value of gymnastics. The use of applied fixtures of any kind, whether jackets or braces, he had almost absolutely given up,—a position that he had maintained for ten years. He thought as much force as the human spine could endure could be applied by a simple method. If the patient were directly suspended by the arms, the latissimus dorsi muscles, having insertions near the shoulder and passing down to the crests of the ilia, became a continuous power from the hand to carry the weight of the pelvis and legs. If the body be suspended entirely by the spine and a lateral force be applied by a girth around the body until the latter be drawn to an oblique position of 45° or 50°, great corrective force is exerted, and patients can sometimes have a weight of fifty pounds additional or even more. He thought that in this way the greatest amount of force could be applied.

Dr. N. M. **Shaffer** said that from his studies of lateral curvature it seemed to him there were two classes of cases, one which had been very aptly described by the last speaker, and which he believed he had first described in 1876,—*i.e.*, a lateral curvature due to poliomyelitis anterior,—and another class, in which there was, as in torticollis, an arrest of development on one side. In the first class the resulting deformity was exactly that which occurred in club-foot, for instance, where the lateral muscles were paralyzed and the posterior were in a normal state, but were contracting gradually. In the second class the patients grew about a curvature which became greater, not because the muscle shortened, but because it did not grow. The greatly distorted shape of the bones in lateral curvature of the spine showed the amount of force involved in the production of lateral curvature. The upright position certainly could have nothing to do with this question: there was an element of growth against resistance, and in the direction of least resistance in nine-tenths of the cases of lateral curvature. In commenting upon Dr. Lovett's paper, as it was being read, he said to one sitting near him that he had already devised, in an inveterate case of lateral curvature in the mid-dorsal region, an operation which consisted in producing a synostosis in the contiguous articular processes. Here was the keystone of the curve, and this operation would prevent a further increase in the curve. He expected this operation would be done in a few weeks.

Dr. **Wallace Blanchard** said that the majority of cases of scoliosis seen by him were removed so far from the office and hospital that it was impossible for them to come with sufficient frequency to make advantageous use of the scolitone. He thought the apparatus of Dr. Lovett met a decided want, as it was portable, could be supplied at a moderate cost, and possessed considerable and correctly applied power.

Dr. **Weigel** said that one should bear in mind the fact that the amount of force applied, while efficient and capable of producing a marked change in the anatomical conditions, was made for a limited time only, so that the patient was subjected to a corrective influence for only a very short period in the twenty-four hours. He understood Dr. McKenzie to say that he had discouraged the use of supports in these cases. This seemed to him a question of very vital importance. In his own mind there was no question that a case of lateral curvature could be corrected to a certain degree by the forcible methods, but in addition to this it was absolutely necessary to maintain the correction for every minute in the twenty-four hours. He believed it to be advisable to make a cast of the patient, and, after being corrected, to make a jacket over it, which will keep up all day, though perhaps in a modified form, the same kind of correction that was obtained by the forcible correction apparatus. This seemed to him a matter of the greatest practical importance. Dr. Weigel then presented a cast which had been made from a patient in whom the curvature had progressed to about the third degree. A corrective jacket had been made which, he thought, must certainly exert an influence in maintaining a better static condition of the spine than could be done by any voluntary effort on the part of the patient. He had not found any great difficulty in having his patients come every day to the office for a sufficient time to secure whatever benefit was possible from systematic treatment by gymnastics and other corrective measures.

His only object in presenting this paper jacket here again, the principle of which had been explained at the meeting at St. Louis in 1893, was because some of the members said that they had not found it satisfactory. This was because it had been finished by them with shellac, but shellac was not waterproof. He had never recommended such finishing, but had advised the use of bath enamel. He had found, however, that this sometimes chipped off, and hence he now had the jacket enamelled with five coats, and the enamel baked on. This was perfectly waterproof, and possessed very considerable strength, so that it did not twist or get out of shape, if properly made. As compared with the aluminum jacket, it was about one-third lighter.

Dr. **Ridlon** said that in his cases of bad lateral curvature requiring permanent support he had been in the habit of using Weigel's paper jackets. He had known them to last three years.

Dr. **Bradford** said that the jacket was most useful, but required care in its use, and was expensive. He had been using a jacket made of sheet celluloid. This was easily moulded under boiling water, the hands being protected by thick rubber gloves. In this way the celluloid was made like soft leather, and could be moulded upon the cast. This made a very pretty jacket, which would ordinarily last a year, and sometimes would wear even for two years.

Dr. Lovett, in reply to Dr. McKenzie, said that he had tried to make all the propositions in his paper plain. and he wished no one to accept them without demonstrating them to their own satisfaction. With regard to the method mentioned by Dr. McKenzie (of applying force in a right dorsal left lumbar curve, for instance), if the patient were hung up by a strap over the right side of the chest and weights put upon the feet, he thought the lumbar curve would be inevitably exaggerated. Dr. Lovett showed a simple apparatus for home use in the forcible correction of lateral curvature.

V.

CLUB-FOOT STRETCHER.

GWILYM G. DAVIS, PHILADELPHIA, PA.

After a considerable experience in the straightening of club-feet by means of division of tendons and forcible manual stretching over Koenig's block and the use of wrenches resembling those of Thomas and McCurdy, I became convinced of the desirability of possessing an implement with which I could apply any amount of force desired, in the direction desired, and with the least liability of injuring surrounding structures, such as the ankle joint and leg bones.

Manual stretching, even over the block, was found ineffectual for very severe cases, unless carried to an extent which to me was unjustifiable. The persistent and repeated "maulings" —I can find no more appropriate word—to which the foot was subjected endangered its integrity and even life. The use of wrenches necessitated a most careful application of the force and holding of the ankle to avoid tearing its ligaments or breaking the bones of the leg. To overcome these objections, I took the two steel handles of the ostoclast that I exhibited before the American Orthopedic Association in 1899 (see Transactions), and fitted to them a foot-piece. The illustration shows the two handles united by a hinge at one extremity. On the upper is fastened a rubber pad. On the lower is a foot-piece which is slid along the bar and clamped at the desired place. The two supports for the heel and front portion of the foot can be separated to accommodate the size of the foot. It can be used for patients of all ages, and I have used it on infants as well as those of near adult age. In using it, the heel is placed on one support and the front of the foot on the other. The upper handle is then brought down on the arched instep or dorsum of the foot.

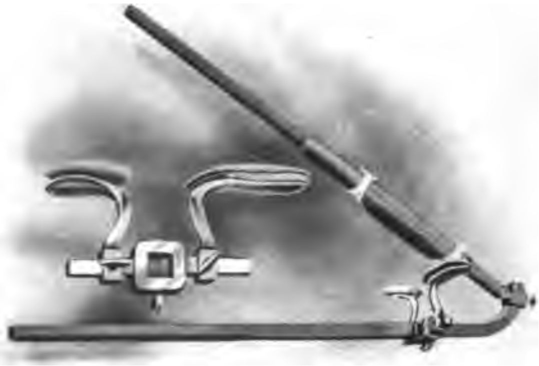
Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

In this way, by two or three pressures, a severe case can be thoroughly stretched without excessive physical exertion.

The amount of force used can be accurately controlled. If much is desired, the upper handle is placed beneath the axilla, while the lower one rests on the table.

Any amount of force can be applied to the tarsus without the slightest fear of injuring the ankle or leg bones.

In using it, I have frequently heard the ligaments crack, but have not broken even a metatarsal bone. The utmost damage done was in one case to split the skin of the sole for about an inch as the foot unfolded. This rent was closed with two catgut sutures, the foot placed in plaster, and primary union occurred.



Club-foot Stretcher, with enlarged view of the adjustable foot-piece.

VI.

THE TREATMENT OF INFANTILE SPASTIC PARALYSIS.

E. H. BRADFORD, M.D.

The treatment of this affection necessarily varies according to the extent of the disease, the age of the child, and the conditions surrounding the patient. Where idiocy is present, no treatment is practicable; but cases of impairment of the intellectual faculties often give the most satisfactory results in improving the patient's general condition and ability to move about and develop by the contact with a larger environment.

In the earliest stages it may be recorded that the surgical problem of treatment is one of training of muscles. Leaving out of consideration in this paper any question of the pathology of the affection, when cases present themselves to the surgeon, they present a disability, owing to the patient's inability to control certain groups of muscles. A balance of muscular utility is necessary for muscular efficiency. This condition does not exist in infancy, and is a process of gradual training from infancy to adult life, and in skilled occupations even in adult life the requisite muscular skill depends upon constant training of the muscles.

In spastic paralysis, owing to the central disturbance, obedience to central voluntary effort varies. A condition of what may be termed muscular rebelliousness exists in certain muscles and in the attempt at certain movements of the hand or foot. The child is in the condition of a circus driver of many horses which become tangled from inability to use the reins to each horse. If we can imagine the horses' reins varying in elasticity, the parallel will be more complete. It is necessary for the child not only to learn the connection between the mental effort and the muscular response, but to also learn the amount of effort

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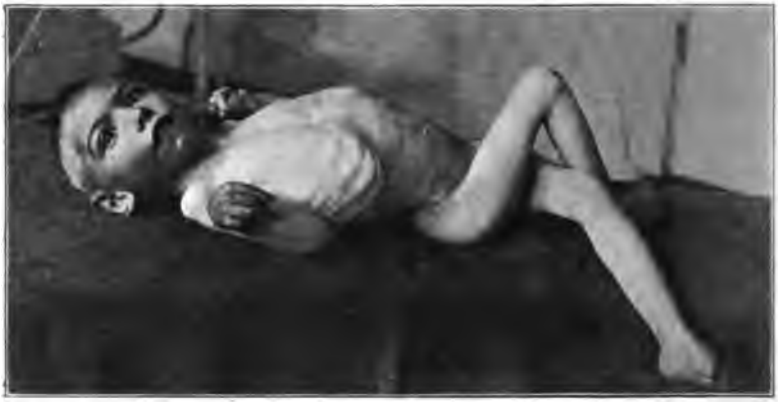
needed for certain groups of muscles which is greater than that which is needed for others.

In cases which are at all advanced, the treatment is a double one, and consists not only in muscular co-ordination, but the stretching of the over-contracted muscles. In later cases still the prevention of the fibrous degeneration of muscles and the overcoming of existing hypertonicity of muscular groups are all factors in the problem. A typical case of a severe type will present at an early age an inability on the part of the child to stand or even sit. There may or may not be disability of one of the hands; although a certain amount of intelligence exists in all cases which are capable of treatment, yet children with this affection are usually backward, partly from the central lesion and partly on account of the deprivation on the part of the child of the natural means of mental training by locomotion or association with other children. If the child attempts to walk, the hamstrings, adductor and calf muscles, are trained in a state of hypertonicity, and all locomotion is impossible. At this stage it is customary for the patient to submit to massage and the application of electricity. It is doubtful if a sufficient amount of benefit is obtained by this treatment to justify the discomfort experienced by the child. In this early stage muscular training is of the greatest importance. Patients

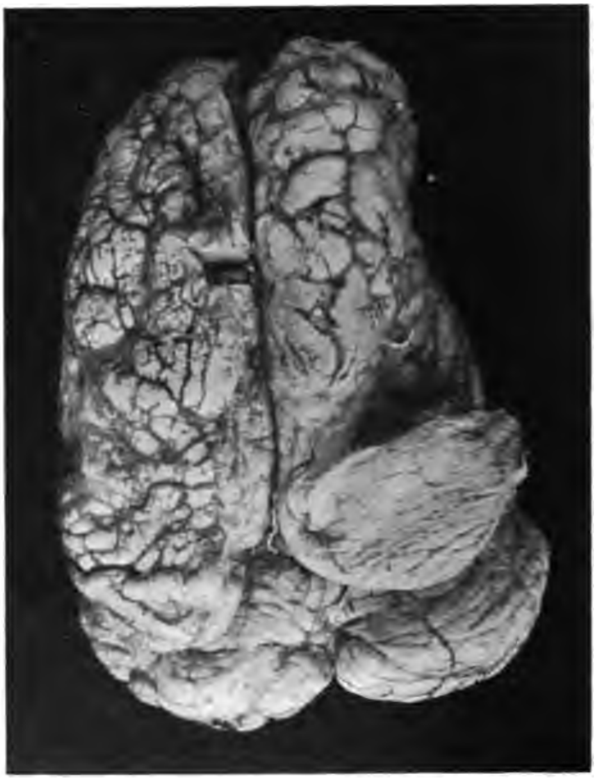


Severe Infantile Spastic Paralysis.

should be stimulated to drag themselves or roll about in any possible way, and a gradual improvement will be observed if the child is under the care of a sensible nurse who will stimulate every effort of the child.

The first mechanical arrangement which will be found of benefit in cases of this sort is usually a wheel crutch or a baby jumper. Benefit can be obtained in utilizing the child's natural tendency to use the arms in a pulling direction; and "exercisors" arranged as a rowing machine, or a trapeze or sloping ladder, can be all utilized to strengthen the child's muscles and foster a desire for activity. Children will be found to improve gradually even in the severer cases; and an excellent arrangement can be made at this stage by the employment of parallel bars placed close together and encouraging the child to walk, the hands placed upon the bars steadying the child, and the pressure of the bars against the hips answering for a similar purpose.

When the child has reached the age of six to eight, the questions of the use of apparatus or of operative procedures suggest themselves. The use of operative procedures alone, without any tenotomy, is inadvisable, in case the muscles are of any strength. Appliances usually add to the child's disability, and prevent his developing the necessary amount of muscular training. In some cases, however, light apparatus, such as a caliper appliance for the leg or light varus or valgus ankle supports, is of benefit. Usually, however, when children have reached the ages mentioned, the question of operative interference is an urgent one. The object of operative interference is of course to restore the balance of the muscles in such a way that the hypertonicity of one group of muscles may be corrected, enabling the overweighted opposing muscles to regain a chance of development. The muscular groups which need consideration in this particular are the adductors, hamstrings, and the calf muscles. Where a condition of equinus is present, simple tenotomy is of the greatest benefit. It should be followed by fixation of the limb in a corrected position, but not in an overcorrected position, as it is particularly important not to lengthen unduly the tendo Achillis. After the retention of the plaster of Paris for a few weeks, the use of a light ankle support with the requisite check to undue extension of the foot is desirable for a few months, after which all apparatus should be discarded and massage employed. Where the hand muscles are divided, tenotomy can be used; but it has seemed to the writer that an open incision gave the surgeon more accurate knowledge of the contracted tissues. The same is true where the adductors are involved. Only a small incision is needed. The tissues are retracted, and the shortened muscular septa can be divided by scissors. The limbs should be immediately kept straight by a plaster of Paris bandage applied to the whole limb, and the



Distorted Brain in Case of Infantile Spastic Paralysis.

child placed upon a bed frame with, in case the adductors are shortened, adducting straps which will retain the child for a few days in a position of marked abduction of both limbs. After the wounds have healed, the child may be allowed to be lifted about, wearing caliper appliances with abducting straps at night. All appliances can be laid aside in the course of a few months.

Where, as is not infrequently the case, this condition exists in the upper extremity, operative measures of greater delicacy are needed. In a few instances a shortened condition of the pectoral muscle will be found to be present. The patient is unable to move the arm from his side. Where this is present, an incision over the shoulder and freeing completely the insertion of the pectorals upon the head of the humerus, followed by fixation of the limb in an outstretched position, will be followed by benefit.

In the more common condition, however, the hand and fore arm are the parts which are chiefly affected. The hand assumes the well-known claw position, the fore arm is flexed at the elbow, and the hand is strongly pronated. Examination of this condition shows a contraction of the biceps, a contracted condition of the pronators and of the carpal flexors. The common flexors of the fingers are usually only secondarily involved, and the condition which presents itself to the surgeon is the simplest means of overcoming the hypertonicity and contraction of the above-mentioned muscles in such a way as to enable the patient to utilize the hand.

Forcible correction of the hand and arm under an anæsthetic and a retention for some time in this position has been recommended, but it would appear from practical experience that fasciotomy or myotomy in addition to the forcible correction will give better results. In the experience of the writer the division of the intermuscular septa enables the stretching of the fibres of the contracted muscles sufficient to restore the proper muscular balance without involving extensive dissection. Tenotomy of the muscles of the hand and fore arm has not seemed to the writer as beneficial as fasciotomy.

Transplanting of the pronator radii has been done by the writer in three instances. In one of these the benefit of the procedure was marked: in the others, although a temporary benefit followed, the ultimate gain was not as great, perhaps owing to the difficulty of inserting the end of the pronator muscle in a proper position to enable it to act as a supinator, which was unusually great, owing to the shortened condition of the muscle.

A great deal of benefit can be obtained in these simple operations in the fore arm and in the hand. The writer has not found as much benefit from tendon transplantation as has been mentioned by some writers. The lengthening of the muscles by the division of the septa and intra-muscular fibrous bands, followed by over-correction, has been in several instances of marked benefit. It must, however, be clearly understood that these operations are simply a basis for careful muscular development and muscular training by use and exercises carefully suited to the patient. If these are not attended to, the benefit from the operation will be slight.

VII.

THE EARLY OPERATIVE TREATMENT OF TUBERCULOUS OSTEITIS OF THE KNEE.

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Except in rare instances, when tuberculous disease of the knee begins on the tibial side of the joint, or in the periarticular tissues, the initial lesion may be referred almost universally to the femoral epiphysis. The clinical signs of its presence in that part of the bone are indicated with reasonable clearness for a considerable period of time, before consecutive infection of the joint has taken place. The focal area may acquire quite sizable proportions, and the contours of the knee become much altered, before the suggestions of its epiphyseal location are lost in the gross infiltrations which attend the spread of the disease.

Although not generally practicable immediately following the invasion of the epiphysis, to determine the site of the focus, the clinical phenomena at a little later period in the development of the disease point quite clearly to the inner condyle as its most frequent seat. This view is further re-enforced by the relatively greater exposure and frequency of trauma on that side of the articulation, as determining localization of infection. The knee joint is not immediately menaced by the presence of the disease in the epiphysis, and the search for the focal site may be deferred for quite a period of time with safety, as regards liability of its extension into the joint.

This statement receives frequent corroboration, practically, in the earlier stages of the disease, during the employment of conservative treatment. The motive for the very general recommendation of conservative treatment at that time depends, no doubt, on the fact of the focus being small and not in very close proximity to the articulation, and therefore giving rise to only a slight amount of reaction in the joint. By the temporary

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abolition of knee function in connection with this method of treatment, the encapsulation of the focus is greatly favored, and extension of infection retarded or occasionally arrested. Failing, however, by measures directed to the restraint of the joint, to control the spread of the infective process in the epiphysis, the increase of disturbance referable to the inner condyle, and musculature, may be easily noted. These become still more evident in cases in which no restraint of knee function has been employed in the earlier months of the disease. In either instance the clinical signs are adequate for determining approximately the part of the articular end of the bone which is involved, and the probable nearness of the focus to the articular surface. The symptomatology in this connection scarcely requires alluding to. The early reflex response of the muscles; the periosteal infiltration over the condyles, and the appearance of expansion or enlargement, especially of the inner condyle; and tenderness from digital pressure on the lateral aspect of the condyle,—are among the more important signs. Another phenomenon associated with the foregoing at a later period, and indicating the encroachment of the focus on the joint, is reaction inflammation in the periarticular and synovial tissues. Until this is indicated by infiltration and effusion into these tissues, it is safe to infer that the joint is in no immediate danger. This may also be present in a well-marked degree and for a considerable period of time, and still be non-tuberculous in character. It may be stated, therefore, that a well-defined period of time, of variable length, intervenes between the appearance of appreciable signs of a tuberculous focus in the epiphysis and the consecutive infection of the knee joint. Advantage may be taken of this opportunity to employ an early operative procedure, to remove the tuberculous area from the end of the bone, without intruding upon the joint or doing injury to the line of growing tissue beyond what the disease has already inflicted.

Diagnosis by the clinical signs has been emphasized for the reason that these may be, generally, relied on to locate the site of the disease with sufficient accuracy for its contemplated removal by operation. In seven cases where the operative procedure to be described was adopted, the location of the focus was ascertained without other aid. Additional information may undoubtedly be derived from the correct interpretation of skiagrams skilfully made; but absence of technical knowledge in the application of this diagnostic agent renders it valueless for the purpose of an operative guide. Reliance placed wholly on its showings might nullify the evidence derived from other entirely trustworthy sources.

The operative procedure recommended in this connection may be described as follows:—

First.—To trephine the condyle in the suspected locality. An incision about two inches long is made through the skin and underlying tissues on the lateral aspect of the condyle, exposing the capsular ligament and the periosteum just beyond its margin. The periosteum and the margin of the capsular ligament are then elevated together at the point of intended perforation of the bone. With a half-inch gouge a circular button of bone about three-fourths of an inch in diameter is removed from the condylar wall. The epiphyseal line is then penetrated in an oblique downward direction with a small bone curette, and a search made with this instrument for the softened area of bone. Ordinarily, the curette at once enters it, giving the sensation to the operator of penetrating a cavity. The greatest extent of the diseased tissue, in the cases operated on, has been found on the distal side of the epiphysis, reaching close to the articular plate. There were well-defined walls of condensed tissue limiting the focus in each instance; and, judging from the shape of the curetted cavity, the focus may sometimes have an irregular and rambling direction. Contact of the instrument with firm bone indicates the limits of the disease, and removes all doubt of the complete evacuation of the tuberculous tissue. After thorough curetting of the affected area, the surfaces of the cavity are carefully touched with 25 per cent. solution of zinc chloride, passed into it on a probe covered with a pledget of cotton. Care should be used not to touch the margins of the incisions with the zinc chloride, that primary union may not be prevented. The bone cavity is then flushed with a 1–2000 bichloride solution, and filled with a 10 per cent. solution Ac. Carbol. and Tr. Iod. in glycerine. As much of the latter as will not run out of the wound may be allowed to remain, the surface being wiped dry, and the periosteum and skin separately sutured.

Second.—Correction of knee malposture. Flexion malposition incident to the epiphysitis is relieved by open division, within their sheaths, of the hamstring tendons. This may be done through either a longitudinal incision over the outer and inner tendons respectively or a single incision obliquely crossing the popliteal space, exposing both groups. In any instance when flexor contraction does not disappear during anæsthesia, division of the tendons is indicated, and, in the opinion of the writer, is preferable to traction or forcible stretching for overcoming the shortening of these muscles.

Theoretically, it would seem that forcible correction of such malposture was especially to be avoided, from danger of crushing in the articular plate of the condyle, which by the disease or the curetting operation may have been weakened to a degree that would not withstand much leverage force.

After these combined procedures and the suturing and dressing of all operation incisions, the limb should be fixed at once in the straight position by a plaster of Paris splint. As primary union of all operation wounds is expected, the patient may be given ambulatory privileges with crutches and high shoe at the end of a fortnight.

The removal of the tuberculous focus, and, coincidentally, eliminating irritation from mechanical sources and from reflex muscle spasm, are calculated to place the joint in a condition to manifest immediate improvement. And, accordingly, it may be seen, shortly following the operation, that the irritation phenomena are greatly modified, infiltration in the periosteal and capsular tissues rapidly absorbs, and reparative efforts in the bone progress uninterruptedly. Judging by these signs of improvement, the duration of treatment is markedly shortened as compared to that incident to conservative methods.

Preservation of joint function in this connection depends in a large degree on the extent to which previous reaction inflammation had impaired movement. The exudate, being often non-tubercular, may be safely broken up at the time of operation, if motion in the joint, after division of the tendons, is not quite free. Careful movement of the joint in such cases should also be made at appropriate intervals after the operation. No interference with motion in the joint should be anticipated when the removal of the tuberculous focus has been made at an early stage of its development.

The earlier the attempt is made to remove the disease, the greater the probability of there being but a single focus, and that a small one. There should also be expected, at that time, relatively less disturbance from muscular contraction and reaction synovitis. Division of the hamstring tendons might thereby become unnecessary, and the complication from adhesions avoided.

The preservation of function in the flexors following the division of their tendons in the manner suggested is an assured event, if it is done strictly within the tendon sheaths. This preserves the continuity of the muscles with their points of insertion during the ensuing tendon repair. In some instances vicious contraction of these muscles necessitates extensive division of the tendon sheaths, in addition to the tendons, fascia, etc., to obtain sufficient correction of malposture. It may then become necessary to ignore their future use, and depend on the flexion power which the gastrocnemius is capable of supplying. Such cases usually recover only a very limited amount of joint movement, so the loss of the hamstrings under these circumstances is not of great importance in performing good locomotion. The elongation of the hamstring tendons also by splitting and suturing may, if practicable, be done, when the shortening is great enough to require free division of all resisting tissues back of the knee.

The removal of a limited tuberculous focus from the lower end of the femur is not a new suggestion in the treatment of articular osteitis of the knee. As a method of early radical treatment, it has not been advanced, apparently, because of uncertainty, often expressed, of the operator's ability to locate the focus, or from the probable presence of multiple foci, which would not insure the entire removal of the disease. More than these, however, its development as an established operation, in the early stage of tuberculous osteitis, has been retarded by the claims advanced for the non-operative or conservative plan of treatment. The latter has been the almost universal plan of treatment covering the period of time between the invasion of the epiphysis and the consecutive infection of the joint. Its claims are based on the expectation of arrest of the tuberculous process by encapsulation, or reparative osteitis, in the presence of complete repose of the joint. Failure to secure such a result occurs in a large number of instances, not because the method properly applied is inadequate, in selected cases, but from faulty application and indiscriminate use. In addition there is the difficulty of obtaining the requisite co-operation during the long period of time that the conservative plan of treatment necessitates.

Its use at a time when the tuberculous osteitis has advanced so far as to make it certain that only a limited restraining influence could thereby be exerted on the disease is no doubt responsible for many such cases passing into the stage of joint involvement in connection with its employment. A radical operation for the removal of the epiphyseal focus at that time would often prevent the consecutive infection of the joint. When the latter event is impending or has occurred, there is general agreement among surgeons that the limitations of conservative methods have been reached, and that excision of the joint is demanded. Between the extremes of localization of the disease in the epiphysis and its spread from that point to the articulation there appears to be no formulated plan of treatment aside from the conservative. The opportunity afforded by the intervening developmental conditions for an early operative procedure, directed to the removal of the focus, would appear to have been but little appreciated or made use of in practice. The advantages from its extirpation while the disease is confined to the end of the femur require no comment. In view of its accessibility to operative interference, the shorter period of treatment, the preservation of a greater amount of functional usefulness,—when these may be obtained by measures so easy of application,—one questions the propriety of recognizing the claims of conservative treatment beyond the time when the location of the disease in the epiphysis may be determined even approximately.

The plan of early operative treatment presented by the writer has been tried in his practice and by some of his confrères at his suggestion, and its merits ascertained with a degree of assurance that warrants its further employment. Of eight cases which I have quoted in this paper, two (Cases 7, 8) are still recent in point of time since treatment was begun. Their progress during that period, however, has been in keeping with cases which have been longer under observation and whose recovery is established. In none of the recovered cases has there been a relapse or a lighting up of the tuberculous process on resuming the use of the joint, after an appropriate interval of post-operative rest. Fixation of the joint has not been required beyond six months in any instance, and protection has generally been discontinued during the ensuing six months. Briefly, in the cases of more advanced development of the disease the duration of combined joint repose and protection following the operation has not exceeded one year. The time consumed in the post-operative care of the joint has been relatively less in proportion to a shorter duration of the disease prior to operation, or when its advance had been retarded by rest treatment. In one case in which the focus had been present for about six months, recovery was established, with complete preservation of the joint, in seven months following the operation.

It is not advisable to employ this procedure in cases that present evidence of even slight infection of the joint. No result could be secured thereby better than by resorting to a typical excision. Failure to establish arrest of the process in the bone by early removal of the tuberculous focus in no way impairs the result to be expected from excision of the joint, if necessitated later. In the event of a recurrence of the disease *in situ* there is nothing contraindicating a repetition of the curettement, provided the joint has not been inavded. Should the removal of the diseased bone have been incomplete, the vent established by the trephining operation provides a ready escape for the products of tissue degeneration, and greatly lessens the danger of infection of the joint. The accompanying memoranda of cases, which are chiefly in the nature of a preliminary report, will serve to illustrate some of the conditions for which the foregoing plan of treatment was employed. End-result photographs were obtainable in only two cases in time to use in this connection, some of the patients living at a distance and trace of two of them having been temporarily lost. The treatment employed was the same in all, except Case 5, the division of the hamstring tendons being omitted in that instance from absence of contracture during anæsthesia.

A brief summary of some of the more important results obtained in the recovered cases might be conveniently mentioned. The range of preserved movement in the knee varied between complete functional restoration, in one case, and limitation of movement at 15° of flexion, in one case. Intermediate to these were four cases in which there was free flexion movement from 60° to 90° from the straight position of the leg. In the patient with the least amount of motion* the range is susceptible of further improvement by movement during anæsthesia. Extensive adhesions existing in this case at the time of operation were broken down, but recurred during the subsequent fixation of the joint. Patients whose progress has been watched after leaving the hospital have been reported well at distances of time one, two, and three years after the operation. With two exceptions these patients remained in the hospital from two to six months after the operation, affording a suitable opportunity, before leaving the institution, to judge of the controlling effect of this plan of treatment.

CASE 1.—Geo. J. Male, three and one-half years old. Admitted to Children's Hospital January, 1898. No treatment previous to entering hospital. History of pain in right knee, and lameness of about nine months' duration. Contraction of flexor muscles and malposture of 45°. Enlargement of lower end of femur and joint from periosteal and capsular infiltration. Moderate reaction synovitis. Inner condyle tender to digital pressure on its lateral aspect. (Fig. 1.)

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*In this patient the range of movement has since been increased to 45° of flexion by movement under an anæsthetic.

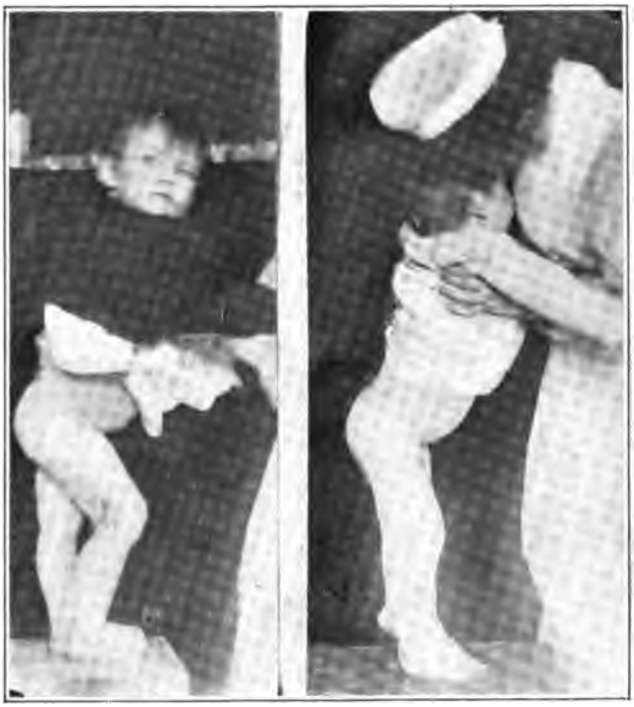

FIG. 1. CASE 1. FIG. 2.

FIG. 1. Appearance of right knee at time of operation.
FIG. 2. Immediate correction of the malposition by division of the hamstring tendons, and fixation by plaster of Paris splint.

Operation one week later: Trephined inner condyle, and removed tuberculous focus with curette. Cavity mopped with 25 per cent. zinc chloride, and injected with Ac. Carbol. and Tr. Iod. 10 per cent. in glycerine. Hamstring tendons divided to correct malposition. Incisions sutured and dressed, and limb secured in straight position by plaster of Paris splint. (Fig. 2.)

Rapid subsidence of acute symptoms in the ensuing four weeks. Plaster splint exchanged for Thomas' knee splint at

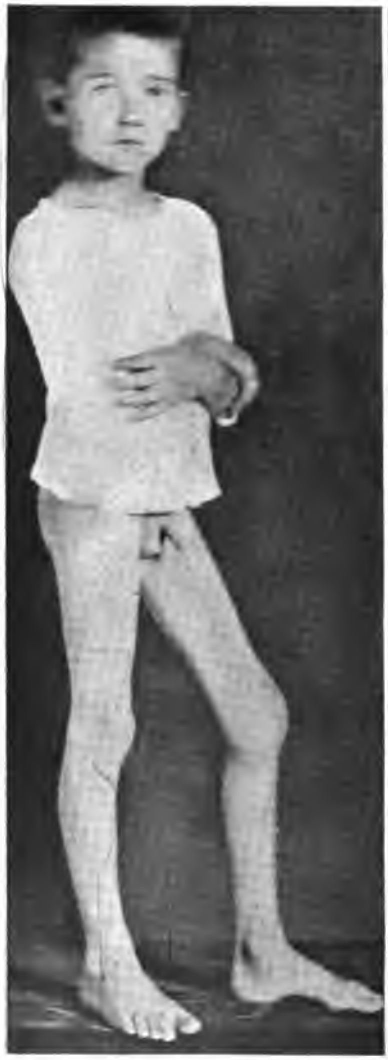

FIG. 3 (CASE 3).

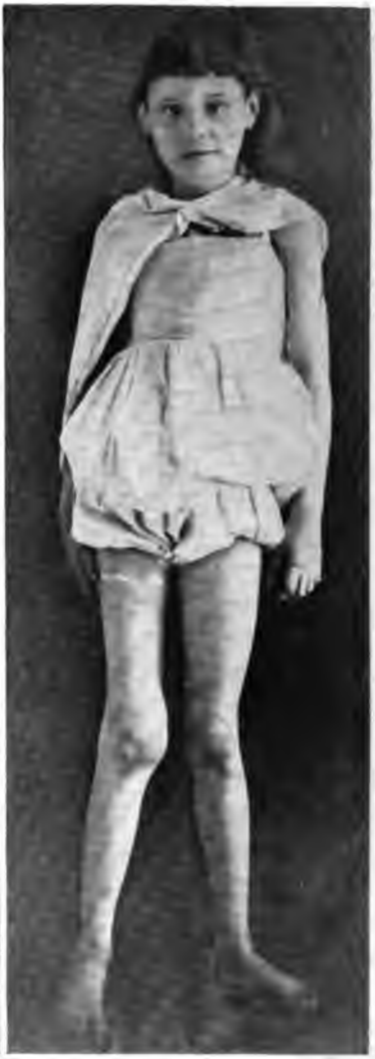

FIG. 4 (CASE 4).

FIG. 3 (CASE 3).—Appearance of left knee at time of operation (end result photograph not obtained).

FIG. 4 (CASE 4).—Appearance of right knee at time of operation (end result photograph not obtained).

the end of two months. Six months after operation all signs of disease had disappeared in knee. Free movement to 60° of flexion. Was taken home wearing Thomas' splint, which was discarded three months later. Patient reported well two years after operation.

Case 2.—F. K. Male, aged five years. Admitted to Children's Hospital Jan. 12, 1897. Tuberculous osteitis of left knee; duration, about one year. Knee flexed 50°. Abundant periosteal and capsular infiltration, with roundness of end of femur; obliteration of normal contours of knee. Joint held rigidly by muscular contraction; painful to manipulation or jarring movement; frequent night cries; inner condyle prominent and tender to digital pressure. Treatment previous to entering hospital had been by traction with weight for about three months, followed by fixation for several months with a plaster of Paris splint. Protection by crutches and high shoe for a time, and later by a long-traction walking splint, was employed intermittently.

Operation January 14: Division of hamstring tendons: knee movements were quite free when muscle restrictions were removed. Inner condyle trephined, and focus found near periphery and extending to articular plate.

Locomotion with crutches and high shoe permitted four weeks after operation. Plaster of Paris splint discontinued in August, 1897; protection by crutches and high shoe until January following. Movement at knee to 45° of flexion when protection was discarded, increasing to 90° in the ensuing year. Patient seen again in 1900, three years after operation. No recurrence of disease; function of the joint nearly equal to that of other limb; growth of limb but little affected by previous disease; no lameness apparent during locomotion

Case 3.—P. M. Male, eight years old. Entered Children's Hospital July, 1901, with tuberculous osteitis of left knee. Pronounced periosteal infiltration and roundness of end of femur, and undue prominence of inner condyle. Contraction at knee to 45° flexion. (Fig. 14.) Duration of disease about two years. Had been treated at times by fixation, extension, etc.; but treatment had been intermittent, and frequently abandoned. Joint not markedly tender, and no indications of reaction inflammation; absence of starting pains. Patient able to walk without much pain. Inner condyle distinctly tender to digital pressure.

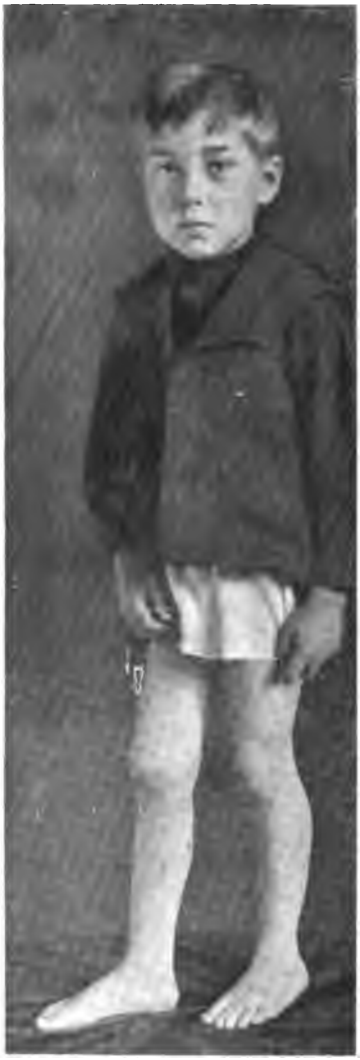

FIG. 5 (CASE 5).

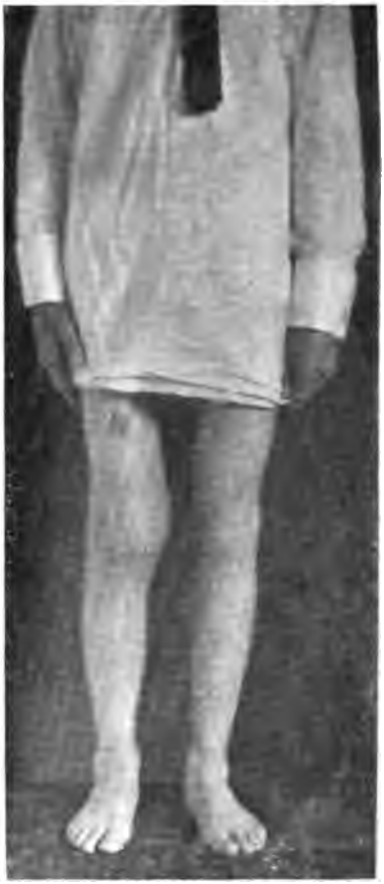

FIG. 6 (CASE 6).

FIG. 5 (CASE 5).—End result nine months after operation on right knee.
FIG. 6 (CASE 6).—Appearance of right knee at time of operation.

Operation July 12: Open division of hamstring tendons to correct malposture. Focus easily found on trephining inner condyle. Its direction was transverse and irregular, not lying close to the articular plate. Hard walls of limiting tissue felt with curette in all directions. The tissue removed was largely débris, only a small amount resembling recent tuberculous tissue. This was a focus evidently of long standing, where there had been a good effort at encapsulation.

Locomotion permitted with crutches and high shoe in two weeks after operation. Splint removed in two months. Movement to 60° of flexion could then be made without discomfort. Signs of disease in end of femur had quite disappeared at that time, and patient returned home, with instructions to continue protection for a few months longer. He was heard from a year later, when there had been no recurrence of knee symptoms.

Case 4.—I. W. Female, eight years old. Admitted to Children's Hospital April 15, 1901, with tuberculous osteitis of right knee. She had been a patient in the hospital four years previous, and treated for the primary attack of epiphysitis, the present condition being a recurrence of activity in the old encapsulated focus. Treatment of the earlier disturbance had been hamstring division and fixation of knee in a corrected position, with protection by crutches and high shoe. She left the hospital at the end of six months, apparently well, and was reported so at intervals for two years. Patient returned to the hospital April 15, 1901, nearly four years later. About two months previous she had fallen on the stairs, striking the inner condyle quite hard. Following this there was pain, swelling and stiffness of the knee, and tendernesss to digital pressure in the condyle itself, which was also much enlarged from infiltration of the periosteum. Signs of moderate reaction inflammation were present in the joint. Reflex muscular contraction acute, but only a slight amount of malposture present,—about 15° of flexion. (Fig. 15.)

April 18, 1901, trephined the inner condyle, and found an old encapsulated focus with dense walls. The material removed with curette resembled osteoporis, with some débris, and recent tissue. Contraction of the flexors disappearing during anæsthesia, the division of the tendons was omitted. After operation, joint fixed in straight position by plaster of Paris splint, and locomotion permitted in two weeks. Patient left hospital six months later, her condition indicating complete removal and arrest of the disease. Movement of joint was free to 60° of flexion. Trace of this patient has been temporarily lost since leaving the hospital.

CASE 5.—H. H. Male, aged six years. Injured the right knee in July, 1900, limb being caught in an extreme flexed position in a churn. The immediate disturbance soon subsided; but lameness, swelling, and pain gradually developed during the ensuing six weeks. There were attacks of acute

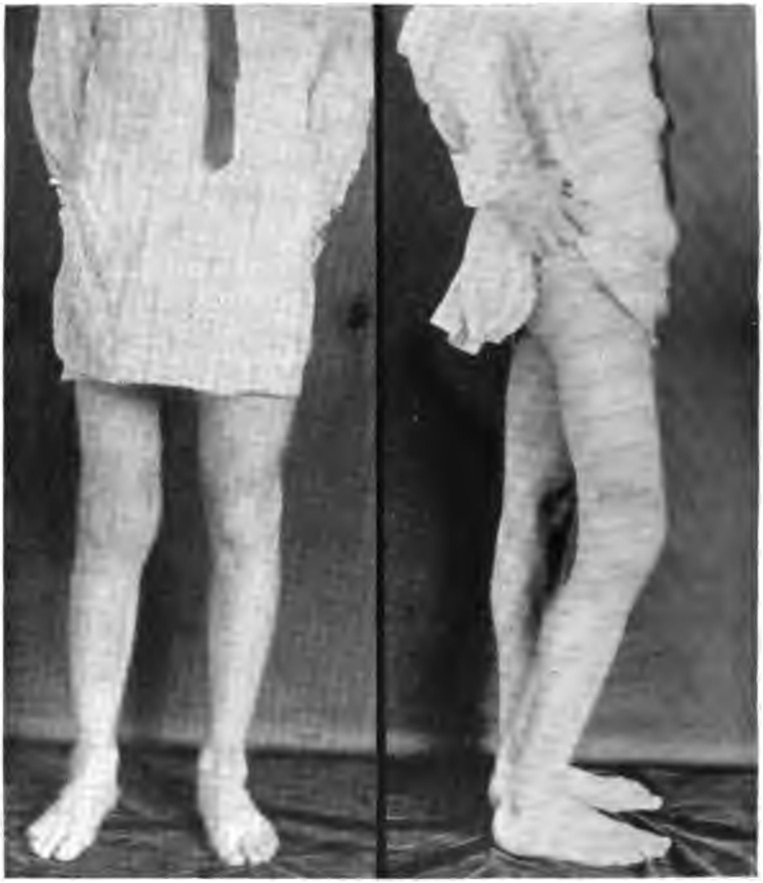

FIG. 7 (CASE 6). FIG. 8 (CASE 6).

FIG. 7.—The same, eleven months after operation.

FIG. 8.—The same, showing amount of flexion movement eleven months after operation. (This has since been increased to 45° of flexion, by movement during anæsthesia.)

muscle spasm following any unusual effort, which would subside following rest in bed for a week or two. Three or four recurrences of this character occurred at intervals, during as many months. The lameness was intermittent and varied in severity, but was at no time wholly absent.

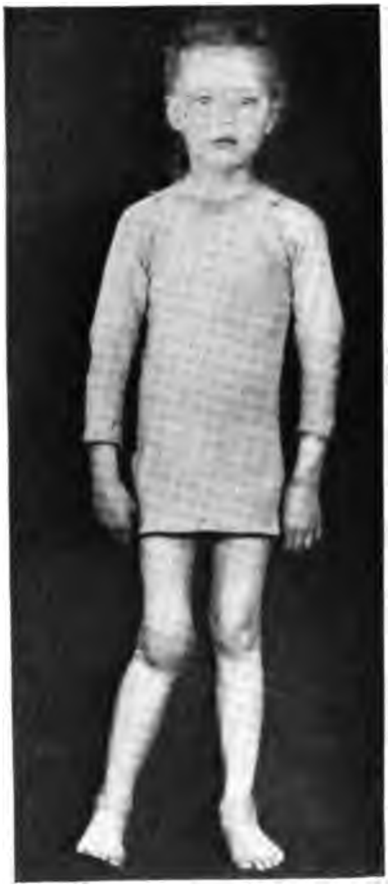

FIG. 9 (CASE 7).—Appearance of right knee at time of operation.

Examination March, 1902, showed moderate enlargement of internal condyle, with a tender point on digital pressure on inner aspect. Moderate infiltration of periosteal tissue, and reaction inflammation in joint, were present. There had been acute swelling of the joint, noticeably following each of the attacks of painful muscle spasm referred to. Moderate contraction of hamstring tendons and flexion, malposture of about 15°.

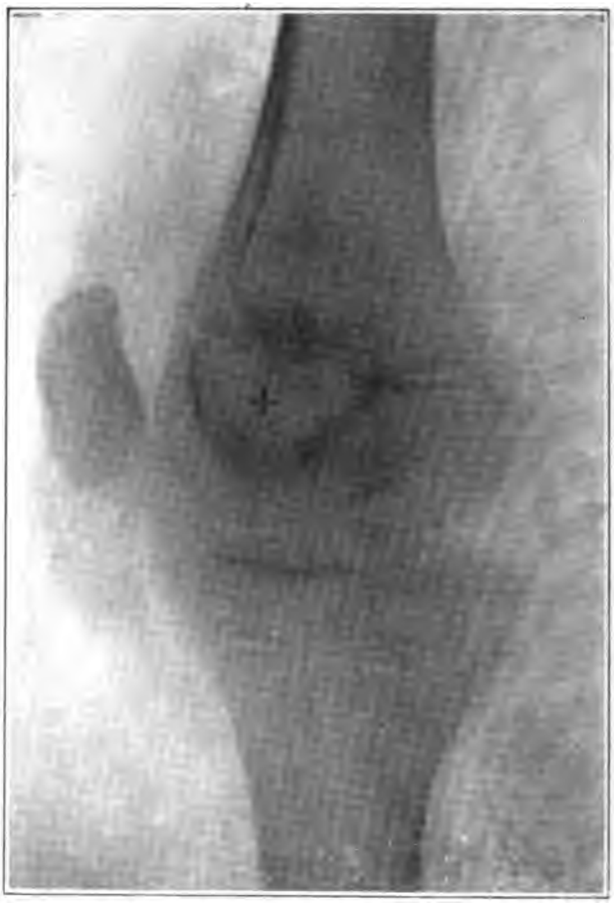

FIG. 10 (CASE 7).

FIGS. 10, 11.—Radiograms (lateral and anterior exposures) showing tuberculous focus (+) in inner condyle, right femur.

Operation April 2, 1902: Trephined inner condyle, and removed focus of moderate size. Disease area enclosed by firm limiting tissue. The flexor contraction was released during anæsthesia, and therefore no division of hamstring tendons was made. Joint secured in plaster splint after operation, and crutch locomotion with high shoe was permitted in two weeks.

Fixation maintained by plaster of Paris splint for about three months. Movement of joint then complete and painless. Protection with crutches and high shoe continued two months longer. There were no recurring irritation phenomena after operation. Examination seven months after operation showed no indications of disease in the condyle or impairment of func-

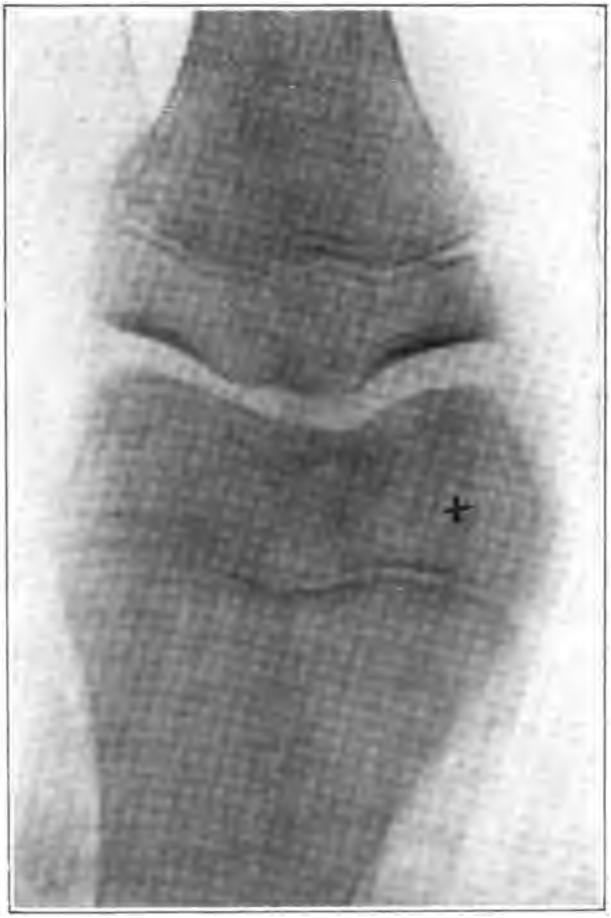

FIG. 11 (CASE 7).

tion of the knee joint. Have heard from patient several times since, and there has been no return of knee symptoms. Appearance of knee after recovery shown in Fig. 3.

Case 6.—H. P. Male, aged nineteen. A year and a half previous to coming under my care had hurt knee by an extreme flexion movement. Following this there was lameness, soon becoming continuous, and accompanied by swelling of the knee. Muscles gradually contracted, holding the limb immovable at 20° of flexion. The end of the femur appeared full and rounded (Fig. 4) from infiltration, and the inner condyle was prominent and tender to digital pressure. Reaction inflammation in joint and capsular tissues gave entire knee an enlarged appearance. Limb painful during locomotion, and movements resisted by reflex muscle spasm. Diagnosis of focus in inner condyle, probably near articular plate, judging by the amount of reaction disturbance in the joint.

Trephined inner condyle June 6, 1902, finding diseased area with ease. This was curetted, and bone cavity treated as in previous cases. Hamstring tendons divided to relieve contracture. Extensive adhesions were found in joint after division of the tendons, and freely broken down. Incisions sutured and dressed, and limb fixed in plaster of Paris splint. Locomotion with crutches and high shoe permitted in two weeks. Gradual subsidence of inflammatory excitement, infiltration, and swelling. Limb again moved under anæsthetic three months after operation, breaking down recurring adhesions. Splint discarded in five months, and protection discontinued three months later. Since that time, patient has borne weight on limb with aid of cane only. Movement in joint free to 15° of flexion, and expectation of further increase in range after another forcible movement under an anæsthetic. (Fig. 6.) Arrest of the tuberculous process indicated by the absence of all irritation phenomena and disappearance of infiltration around joint during the continued and gradually increasing use of limb. Appearance of knee May 8, 1903, shown in Fig. 5.

Case 7.—E. M. Girl, aged six years. Was seen in consultation with Dr. Harvey R. Gaylord, March 6, 1903. History of lameness in knee, and enlargement of end of femur, extending over one and one-half years. The latter part of that period, patient had been in the hands of a notorious quack, receiving no care whatever. At time of examination, March 6, there were extensive periosteal and capsular infiltrations, roundness of end of femur and knee joint, and marked enlargement

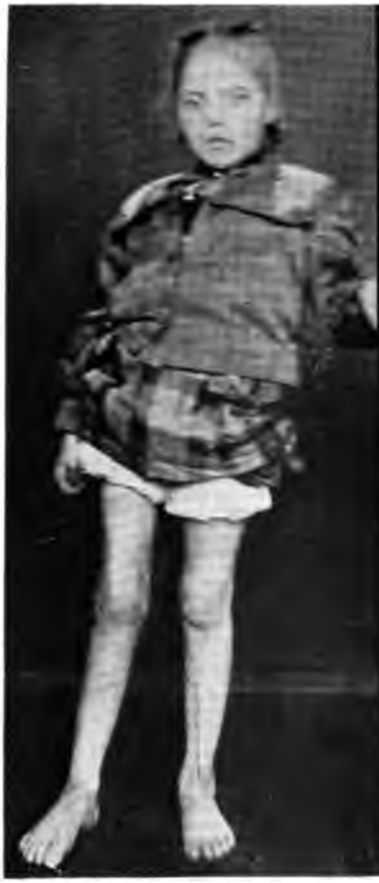

FIG. 12 (CASE 7).

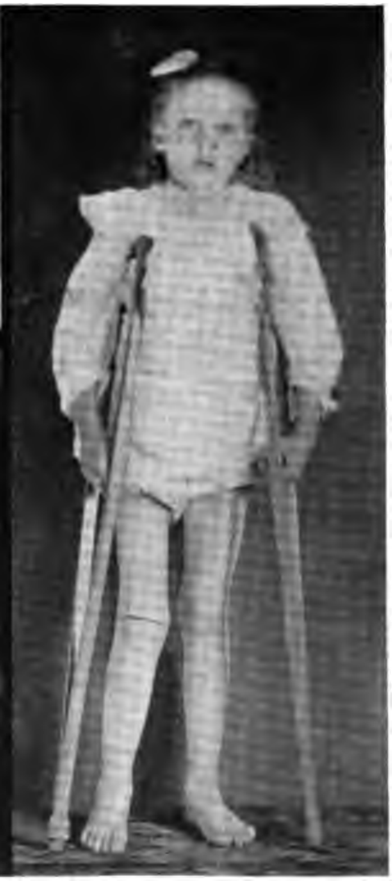

FIG. 13 (CASE 7).

FIG. 12.—The right knee two months after operation. Disappearance of much of the infiltration of the knee. Fixation and protection of the joint continued.

FIG. 13.—The same knee seventeen weeks after operation. Infiltration very much diminished. Free flexion movement to 50°. Fixation splint discontinued, but still protected by high shoe and crutches. Patient still under observation.

of inner condyle, the latter being tender to pressure on its lateral aspect. (Fig. 7.) Limitation of movement maintained by muscle contracture, holding limb rigid at about 20° of flexion.

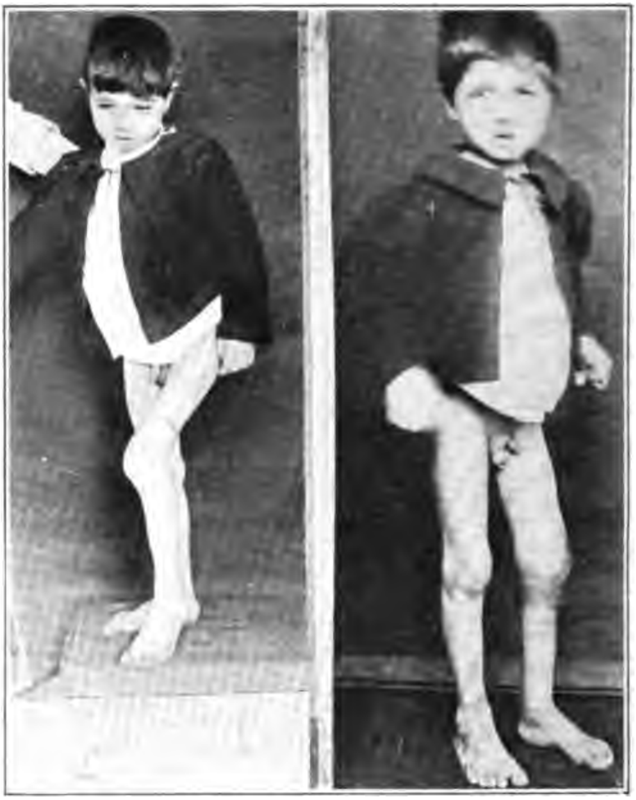

FIG. 14 (CASE 8). FIG. 15 (CASE 8).

FIG. 14 (CASE 8).— Appearance of left knee at time of operation.

FIG. 15.—Same, eight weeks after operation, showing correction of malposture and modification of infiltration. Fixation by plaster of Paris splint and protection by crutches and high shoe continued. Patient still under observation.

Attempted movement beyond limits of restriction excited pain and muscle spasm.

Diagnosis of tuberculous focus in inner condyle, not yet involving joint, but in near relation to it.

Radiographic examination (Figs. 8, 9) confirmed diagnosis of focus occupying large area of inner condyle, the articular surfaces being apparently free from disease. At my suggestion the treatment adopted was the same as that indicated in the foregoing cases. The record of this case has been kindly loaned to me by Dr. Gaylord, with permission to use in this connection.

Operation by Dr. Gaylord, March 6, 1903: Trephined inner condyle, and removed diseased tissue with curette. Applications of zinc chloride, etc., as in cases related. Division of hamstring tendons, and fixation of limb with plaster of Paris splint. Locomotion permitted with crutches and high shoe in two weeks. Rapid improvement in appearance of knee observed on removal of splint and change of dressings, three weeks later. Infiltration, swelling, pain, etc., had much decreased. Passive movement of joint May 7, when splint was again changed, showing motion in joint to 25° flexion. Fixation and protection continued. Appearance of knee two months after operation shown in Fig. 10.*

CASE 8.—S. D. Male, aged five years. Admitted to Children's Hospital Feb. 20, 1903. Duration of lameness and pain about one and one-half years. For two months previous to entering hospital, knee had been too lame and painful to walk,—patient confined to bed during that time. Condition on entering hospital: knee flexed 45°, and fixed by muscular contracture, enlargement of inner condyle; extensive periosteal and capsular infiltration, and reaction effusion in joint (Fig. 12); pain from digital pressure on inner condyle. No radiographic examination was made.

Operation Feb. 24, 1903: Trephined inner condyle, and removed tuberculous tissue from large area extending close to articular plate. The curetted region in the condyle had hard limiting walls and very irregular form. Open division of hamstring tendons. Gastrocnemius remained contracted after releasing hamstrings, leg retaining about 10° flexion. Fixation in plaster of Paris splint. Primary union in two weeks, when dressings were changed. High shoe and crutch locomotion permitted in three weeks, with plaster splint fixation. Rapid decrease of irritation phenomena. Appearance of knee shown in Fig. 13, eight weeks after operation. Fixation and protection continued. Patient still under treatment.

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*Fig. 11 shows appearance of knee two months later,—seventeen weeks after operation. Fixation splint discarded, but protection by high shoe and crutches continued. There is free flexion at knee to 50°.

VIII.

THE ELEMENT OF TIME IN ORTHOPEDICS.

CHARLES C. FOSTER, M.D.

As orthopedists, our greatest difficulty has always been the long time needed for the completion of many of our cases; and our constant effort has been to shorten that time as much as possible without impairing the perfection of our final results.

How much have we gained in the last twenty years?

How much may we fairly hope to gain in each of the various conditions we have to treat?

We must remember that these conditions are usually simply local manifestations of some central, and very often chronic, disease,—active foci in the tuberculous affections, and passive consequences in club-foot, wry-neck, the various paralyses, rickets, congenital dislocation, etc. Until this central, causative disease has run its course and passed away, there can be no certainty of permanent cure. The case is still liable to relapse, and must be kept under observation, and perhaps under treatment. Unfortunately, we are as yet unable to directly attack the causative disease, and must continue to simply patch up its consequences as best we can.

Certain cases, due not to disease, but to lack of development, form a class by themselves. Cleft palate we have left mostly to the dentists, who have made considerable improvements in artificial palates, though not in treatment of the trouble itself.

Congenital dislocation of the hip, formerly hopeless, has now become a most promising field; and the whole advance from Buckminster Brown's first, partially successful case, through the cutting operations on the acetabulum, to Lorenz's satisfactory results, has been made in our own time. I trust the end is not yet.

Presented by invitation at the meeting of the American Orthopedic Association, Washington, D.C., May 11-14, 1903.

It is difficult to state exactly the gain in time, for the time spent on such cases twenty-five years ago was really wasted.

In the various forms of paralysis little has been gained, either in character of results or in time spent. Tenotomy is used more than formerly in spastic paralysis. Infantile paralysis may prove to be an acute infectious disease, but the evidence is yet incomplete. Laminectomy for the relief of the paralysis of Pott's disease is by no means accepted as of established value. Paralysis due to brain tumor, apoplexy, or traumatism, does not belong to our field.

In club-foot much advance has been made. In very young children no better or quicker results can be obtained than by the older methods; for the greatest difficulty in these cases is usually the tendency to relapse, which may persist for several years. In older cases of average severity, plaster of Paris gives us a completeness of control over the case, and a consequent thoroughness of treatment, that often secure results that would probably have been missed without it. In the worst type of cases, the neglected adult, the gain has been greatest both in result and in time. Formerly a really good result was very rarely obtained in such cases, and then at the cost of prolonged treatment and much suffering, as in the case I reported some years ago. Now the wrench, open incision, or the removal of superfluous bone, enables us to promise at least a fair working foot to most such patients, and with little after-treatment, or tendency to relapse. Some day we may learn to tell accurately in younger cases when the danger of relapse is past, perhaps by some test like Dr. Sayre's "point-pressure"; but so far we can only keep on the safe side, and continue our after-treatment plenty long enough. Dr. Henry J. Bigelow used to divide all club-feet into two classes,—one that could pay for treatment and was cured, and the other that could not pay and was incurable. Recent advances have changed all that.

In wry-neck the open incision is of great value, and plaster of Paris makes a most excellent splint; but here also the tendency to relapse often delays the final result.

In rachitic curvatures of long bones and in knock-knee, osteotomy and osteoclasis have shortened the treatment of average cases, and made good results possible in severer ones.

Joint tuberculosis is a field in which modern surgery seemed to promise great things, and has certainly accomplished much; but the disease can seldom be eradicated, and the general infection is often so severe that efficient repair cannot take place until it has run its course. Resection, particularly of the smaller joints, may often prevent reinfection from that particular focus; but often that is not the only one.

Dr. Sayre's introduction of the plaster of Paris jacket was an inspiration, and is undoubtedly the best possible treatment for many cases; but many others need the rest in bed with extra feeding, that is proper for a severe case of tuberculosis of any type.

We may sum up the matter by saying that we are still working from the outside instead of from the centre; that where there is active work to be done—as in club-foot or rickets—we have gained much, but that we often have to wait while Nature does the greater part of the work in her own way, and that we shall continue to do so until further discoveries of the etiology of the causative diseases enable us to attack them directly.

IX.

THE TREATMENT OF LATERAL CURVATURE OF THE SPINE.

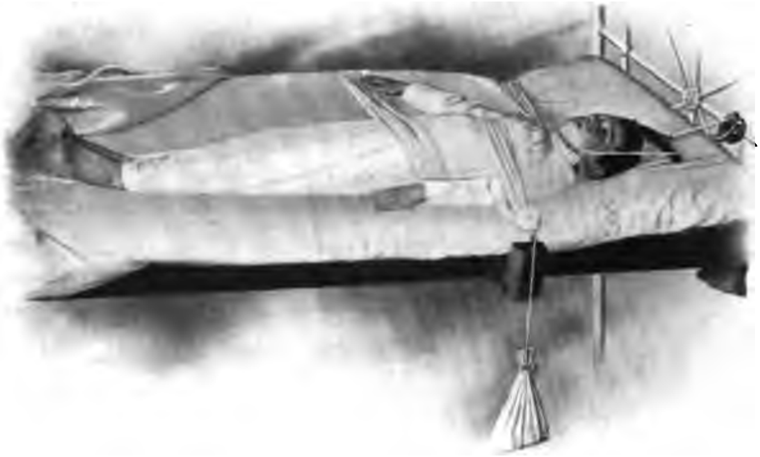
GWILYM G. DAVIS, PHILADELPHIA.

In view of the unsettled condition of both the pathology and therapeutics of scoliosis, I have thought it might be of interest to briefly submit a line of treatment, now on trial, for those cases in which rotatory deformity is marked. Its principle consists in confining the patient to bed for various lengths of time, with longitudinal and transverse traction, allowing him to rise for one to three hours daily for exercises, etc. The method of applying the traction is shown in the illustration. Weight traction by means of a sling is applied to the head. From three to ten pounds is used. If the heavy weights are used, in order to prevent the patient being dragged upward, a bandage is wound around the pelvis and just above the trochanters. From this, in front and behind, pass two bands, which are fastened to the foot of the bed. To make lateral traction, two bands pass, one from the axilla and the other from the hip, and are fastened to one side of the bed, while another band passes over the convexity of the curve, and is attached to a weight over the opposite side of the bed. This weight varies from three to ten pounds.

As heavy weights as the patient can endure with comfort are used. As yet I have not gone beyond ten pounds either for the head or side traction. By this treatment we have the weight of the body removed, and straightening of the spine encouraged by longitudinal traction and direct lateral pressure.

The patient is allowed to rise for one to three hours daily to get the fresh air, and also to practise the usual corrective exercises.

This recumbent treatment is kept up for from three to six months. I have not yet decided as to what can be accomplished by this line of treatment, but it seems promising; and I only report it with the idea of others, if they so desire, testing its value.



X.

EXCISION OF THE KNEE: A CASE.

A. J. STEELE, M.D., ST. LOUIS.

When I commenced the study of orthopedics, the operations of excision and resection of the knee joint were frequently performed. These operations were then popular because they replaced amputation, which previously had been the resort of surgeons in order to save the life of the patient. Tumor albus was a deforming disease, so far as the joint was concerned, and not unfrequently cost the patient his life. So surgeons reasoned, Better sacrifice the limb and trust to a cork leg than to entail a useless appendage on the patient, on the one hand, or endanger his life, on the other.

Twenty years ago I was struck with the numerous specimens of diseased knee joints found in the pathological museums of London. The popularity of amputation had enriched these collections.

Later and in the course of time it was suggested that as tumor albus was a local disease, or at least a local manifestation of a constitutional trouble, the joint and its diseased structures might be removed entire, cut out, and the contiguous bones approximated and so held in straight position until firmly ossified, resulting in a shortened limb with a stiff knee, but, even so, far preferable to the best of artificial limbs. This was a great advance over amputation as a surgical procedure in the therapeutics of tumor albus. But the world moves. So in this instance it was still further suggested: Why remove more than the tissue actually affected? May not this often be done, and the integrity of the joint be saved? The verdict of modern surgery is in the affirmative; and thus the operations of erasion, arthrotomy, and arthrectomy, are the established methods of to-day.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903

But the case is altogether different where the disease has spent itself, and there remains, as a result of the tuberculous or pyogenic inflammatory process, permanent deformity,—most likely, flexion. If true ankylosis is present, then as a surgical measure either osteoclasis or osteotomy is demanded. The former is rarely applicable in bony ankylosis of the knee because of the marked and peculiar deformity, because of the danger of lighting up the original disease, if tubercular, and because of the uncertainty of good union. The latter—namely, cuneiform osteotomy—is, as a rule, demanded. This was practised with happy results in a case recently coming under my care:—

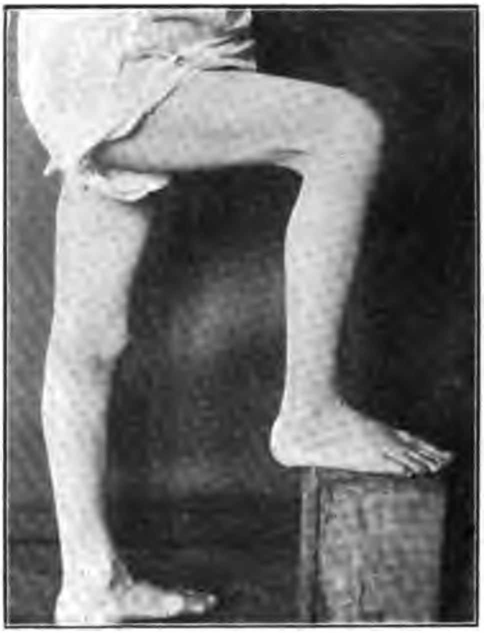


Fig. 1.

A boy, aged fourteen years, came under my notice six months ago, perfect in every particular except that his right knee was permanently flexed to an angle of 90°. Seven years previously he had run a needle into the joint, which lightened up a synovitis. It seems that the attending physician had occasion on account of the swelling to cut into the joint. Whether the articulation became septic from the needle or from the surgical instrument we do not know; but abscesses formed in and about the joint, and continued to discharge for more than a year.

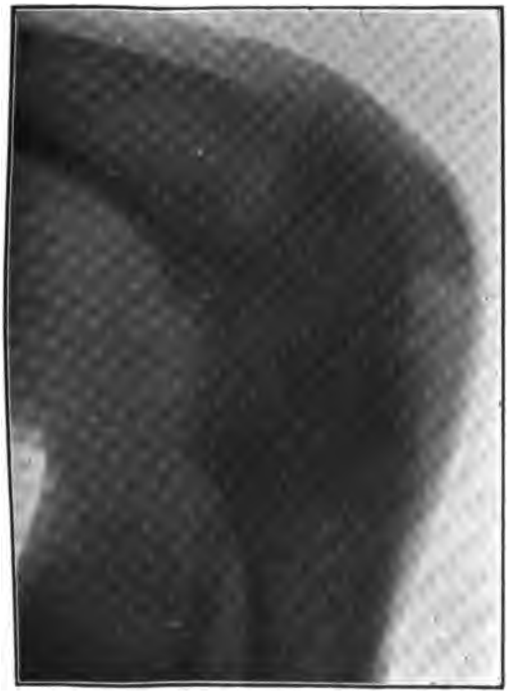


FIG. 2.

Through negligence the joint was allowed to flex to 90°, and so continued for years, deforming and rendering useless the limb. I decided that the ankylosis was "true," which opinion was confirmed by the X-ray.

Excision was plainly demanded, the only question being whether, if done now, it might interfere with the epiphyseal cartilages, and thus the growth of the limb at that point be arrested; and so would it not be better to wait until the lad had his growth? But we decided to operate at once; for, first, the sooner the limb was made useful, the better, as he was a poor lad, and must work for a living; second, care might be taken to avoid one of the epiphyses, and thus the shortening need not be great; third, he might fall into the hands of an amputator, as had already been suggested to him, and thus the whole limb be lost. In my opinion an artificial limb is a poor substitute for the natural one, even though the latter should be imperfect in some particulars.

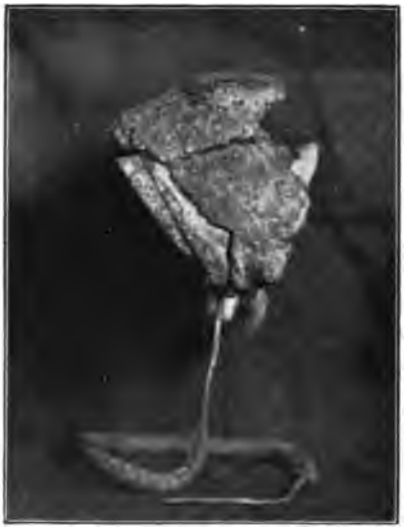


Fig. 3.

The operation was a simple one: A tourniquet was applied to the femoral artery, the tendo Achillis and the hamstrings were tenotomized, a U-shaped flap was turned up, the united patella was torn from the femur by chiselling underneath, a thin metal instrument was passed behind the bone, but in point of and protecting the popliteal vessels, and a cuneiform piece sawed out. So large a wedge had to be removed that the femoral epiphysis was sacrificed, but happily saving the tibial epiphyseal junction. On bringing the leg down, it was found necessary to remove an additional slice, ¼ inch thick, from the femur. This permitted good lining. Two steel nails, three inches long, were driven upwards and backwards through the head of the tibia into the femur in holes previously made with the drill. These nails held the bones firmly. The flap was stitched, antiseptic dressings applied, and one iron rod splint arched around the knee, and with wooden foot-piece was incorporated in the plaster of Paris dressing, the tourniquet having been previously removed. The limb was kept perpendicularly elevated for thirty-six hours, as a little oozing showed itself. The first dressing was made on the third day. The nails were removed on the eleventh day, and the wire splint was substituted by simple plaster of Paris dressing, fortified, as is my custom, with strips of galvanized wire gauze. In the fifth week he was allowed to be up on crutches. In the eighth week a leather splint shaped over a cast of the limb was laced on, which at this date he is still wearing, and will continue to use for many

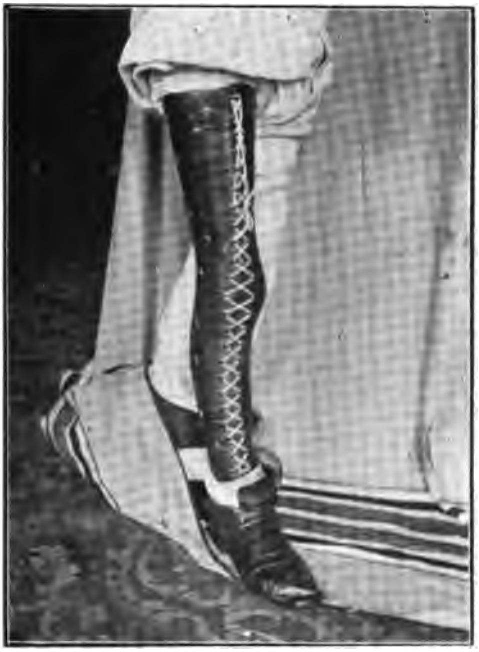


FIG. 4.

weeks to come. A high sole of 1½ inches allows him to walk with but little halt.

It is interesting to note that at no time were there unfavorable symptoms,—no pain, no temperature, no pus. Both the soft and hard parts united readily.

The cuneiform specimen removed shows ossific union of the three bones making up the knee joint. The femoral epiphyseal junction was included in the removed part, the tibial junction barely touched, so that, while there may be no more growth at the former point, it may continue at the latter.

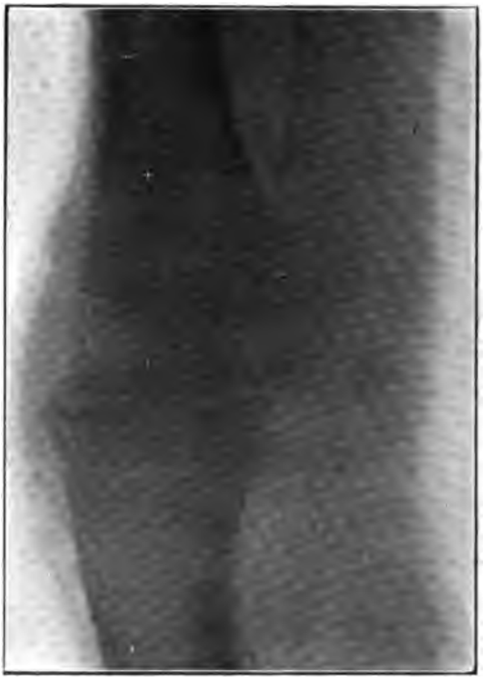


Fig. 5.

In regard to the use of pins in this operation, I have used both ivory and bone; but they eroded, and in one case broke and separated, leaving a piece behind, followed by suppuration. Steel nails are preferable. They hold the bones in line while the dressings are being applied, and steady them until sufficient callus has been thrown out to steady the parts. It may also be believed that they stimulate the formation of callus.

For the after-immobilization of the bones, what can possibly be better than an accurately fitting laced leather brace, fashioned over a plaster of Paris cast of the limb? I do believe that the deforming results following excision of the knee, formerly experienced by myself and others, were largely due to the lack of efficient and persistent support. Still, I do not forget that a marked difference may exist as regards rapid and strong union after knee excision between cases of tuberculous knees and cases like the one related, where no general constitutional affection existed.

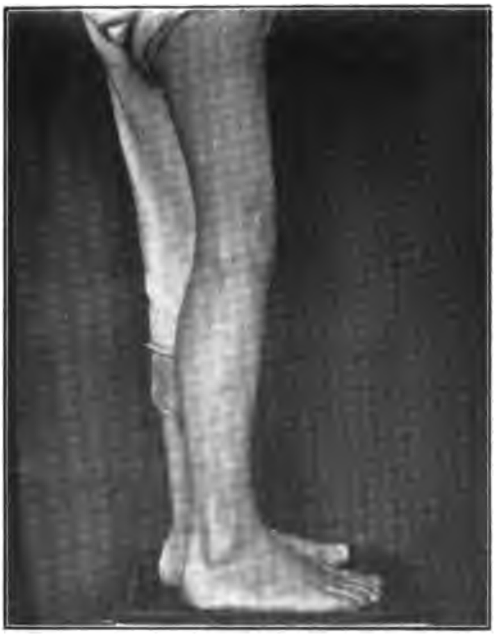


FIG. 6.

ABSTRACTS.

SCOLIOSIS.

198. Contributions to the Pathological Anatomy of the Spinal Column. By Schulthess. *Archiv f. Orthopaedie*, Bd. II. Heft 1.

A. Scoliosis.

1. Comparison of Measurements and Autopsy.

S. had the opportunity to compare the measurements taken *in vivo* by means of his well-known apparatus, with autopsical findings, in the case of a woman thirty years of age whose curvature dated from childhood. The autopsy was made over a year after the measurement, the patient having died of phthisis.

After discussion of the method of measuring and the details of this case the following conclusions are drawn:—

The investigation showed that the measurements permitted the recognition of anatomical conditions in detail. The curves of the spines correspond exactly to these of the vertebral bodies. The torsion of the thorax was also correctly shown. The conclusion is considered permissible that the picture given by the apparatus, together with the measure of torsion taken in forward bending, as well as that of pelvic slant as taken by means of his instruments, gives a perfectly reliable idea of a scoliosis.

2. Autopsy in a Case of Severe Scoliosis.

The patient was a man of forty-nine years, the subject of severe scoliosis since youth. Having suffered for a long time from slight respiratory discomfort, decided dyspnœa gradually supervened. There was pronounced venous hyperæmia of head and neck. The curve was a very severe right dorso-convex, with large rib hump and pronounced deviation of the trunk to the right, in the lumbar segment. The heart dulness enlarged both to right and left, sounds clear, but dull; some bronchitis, but no effusion; liver enlarged; no ascites, but œdema of the legs present. Suspension relieved the dyspnœa, but could not be endured for any length of time. The symptoms increased steadily, and death ensued from pulmonary œdema in several months. The changes found in the internal organs are given in detail, and do not lend themselves well to abstract. The original should be consulted.

The conclusions are:—

One of the first symptoms in these cases is stasis in the neck and facial cyanosis. A certain degree of œdema may be found here before it appears elsewhere. Gradually, the cyanosis appears in the arms and upper half of the trunk, together with evident dyspnœa and labored, shortened inspiration, though without the prolonged expiration found in emphysema. Œdema of the whole surface then supervenes, differing from that of ordinary dropsies in that it does not predominate in the lower extremities or even occur here first. Later it does not differ markedly from the heart dropsy except in the predominance of cyanosis. Death finally ensues in coma from CO_2 poisoning. These manifestations occur early in a form sufficiently grave to attract the attention of the practitioner to the menace to health and even duration of life which severe curvatures carry with them.

Although a complete cure of these symptoms is unlikely once they are present, it is always necessary to consider how far they may be influenced by the treatment of the deformity.

(Such cases as this should form a potent argument against those who still believe that a scoliosis in the young, and not of high grade, is a thing of no great consequence.)

B. Spondylitis.

A case of cervical Pott's is reported in which the autopsy showed that the odontoid process of the axis was about to perforate the dura. This condition, to which the author has before called attention, is favored by the forward position of the head which these patients are apt to present, and which should be combated by the mechanical treatment

Symptoms on the part of the vagus (frequent pulse) and hypoglossus, which were present in this case, are explained by drag upon the nerve roots, and not by pressure.

A second case is reported in which hypoglossal paralysis appeared after the application of a dressing under extension. The paralysis is here also attributed to the drag upon the nerve as the result of slipping between atlas and occiput.

These cases are reported in detail, and should be consulted in the original.

Spondylitis Anterior Superficialis.

Two autopsy reports of this interesting and unusual condition are given. They merit consideration by us especially for the reason that the subject is practically ignored by the well-known American and English text-books.

Cases are also reported of dorsal Pott's with abscess in the posterior mediastinum and one with kinking of the aorta. These are not suited to abstracting.—*A. H. Freiberg, Cincinnati.*

199. A Case of Congenital Scoliosis with Congenital Luxation of the Hip. By Vogel. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

In this case there was seen in the X-ray picture decided abnormity of the pelvis on the side of the luxation. This half of the pelvis lay several centimetres higher than the other. The os pubis and the ischium presented a peculiar torsion, which is well seen in the illustration. It resulted in a shortening of the limb, which persisted after the luxation has been reduced.—*A. H. Freiberg, Cincinnati.*

200. Congenital Scoliosis. By Athanassow. *Archiv f. orth. Chir.*, Bd. I. Heft 3, 1903.

Review of the literature and collection of reported cases. Report of a case with spina bifida, accompanied by photograms and radiograms. In this case there was rudimentary development of one-half of the third lumbar and abnormal shape of the fourth lumbar vertebræ. The shape of the second lumbar was also slightly abnormal. It seemed likely that the right halves of the third and fourth lumbar were united.

He concludes that whenever a spinal curvature appears in an otherwise healthy child at the time it begins to sit, and in the absence of any bone disease, one must think of the possibility of some congenital abnormity. The radiogram can in this case be the only medium of certainty. The radiographic reproductions are very satisfactory.—*A. H. Freiberg, Cincinnati.*

201. Rubber Pneumatic Pads in the Treatment of Severe Scoliosis and Kyphosis. By Lubinus. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

For the treatment of severe cases of scoliosis by means of corrective jackets the plaster is applied in a somewhat modified Hoffa frame and in a sitting position. The seat is adjustable, so that any desired tilt may be given to the pelvis. Instead of trying to achieve the correction before the hardening of the plaster, the author includes in the plaster dressing his pneumatic pads, deflated. One is placed over each rotation hump both anteriorly and posteriorly. A window is cut out in the diagonals opposite the pads and large enough to permit the yielding of the body when the pads are inflated, which is done by means of a bicycle pump at once after the plaster has set and as often afterward as may be necessary.

He holds the correction made by this method to have a number of advantages over the usual way, and that the force which can be exerted is much greater. He believes also that it renders the use of a head support unnecessary except in the very severest cases.

These pads are also used in the correction of Pott's kyphosis by including them either in the plaster bed or in the plaster jacket. In the latter case an opening must be cut out in front to permit yielding, just as in the case of scoliosis.—*A. H. Freiberg, Cincinnati.*

202. Considerations on the Theory and Treatment of Scoliosis. By Port. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

A rather lengthy discussion of this subject, without, however, furnishing any new points of view. The author believes with Maas that transformations, in the sense of Julius Wolff, cannot be accomplished in fully matured bone substance. Finished bone substance is absolutely unchangeable. Hence the importance of the epiphyseal cartilage in the production of scoliosis. Scoliosis is for this reason a disease of the developmental period, and therefore remains stationary when the period of growth has passed.

He finds:—

1. The sole cause of scoliosis is a weakening of a part of the extensor muscles of the back. This consists at first in an overstretching of this group, resulting in more or less diminution of its contractility. In the severest cases this weakening may progress to the extent of degeneration and atrophy.
2. The changes in the form of the vertebræ follow upon this primary muscle fault. An abnormal growth of the bones is brought about by the changes in pressure and tension which result from the unequal action of the muscles.

From this he frames two rules for the treatment and prognosis: 1. Scoliosis can be treated on growing individuals only, and encouragement regarding the result may be sought only in the correction of the deformity through the activity of the epiphyses. The younger the patient and the smaller the deformity, the better the prognosis. As the patients approach the end of growth, the prognosis becomes wholly bad. 2. The treatment must concern itself with the musculature in the first place if the disease is to be attacked at its root. All methods which direct efforts chiefly or exclusively toward the static conditions cannot result in permanent good.

The author recommends an apparatus which is to make possible exercise under the influence of extension. It consists of a pelvic part of celluloid made from the cast and one for the chin and occiput made in a similar manner. Four bands of steel running down from the head-piece to the pelvic part can be lengthened by screws, and thus the extension made.

The use of a corset is also recommended, which acts upon the lumbar segment only. It consists of a celluloid corset cut in two and united by means of parallelogram levers which make it possible by screw force to separate the two halves.—*A. H. Freiberg, Cincinnati.*

203. A Study of the Anatomy, Pathology, and Etiology of Scoliosis. By Compton Riley, Baltimore. *Jour. Am. Med. Ass'n*, vol. xlii., April 2, 1904, No. 14.

The author considers the anatomy of the spine, and points out those features which account for many of the phenomena of scoliosis.

In the consideration of the pathology he calls especial attention to the deformity of the ribs, the pelvis, and the greater length and tenseness of the abdominal muscles on the concave side. The different views as to etiology are discussed, and his own given. He then proceeds to describe the scoliotone and its method of use as a corrective agent.

The article is illustrated.—*Robert B. Osgood, Boston.*

204. School Scoliosis and its Treatment. By Scholder. *Archiv f. Orthopædie*, Bd. I. Heft 3.

The general conclusions of the author regarding the prevalence and character of the scoliosis seen in school-children has been set forth in a former publication. They are repeated here. They are in effect that, in contrast to institutional statistics, scoliosis is about as frequent in boys as in girls; that the cases embraced by these same statistics are largely rachitic, and not truly habitual in their nature. Institutional reports, furthermore, deal chiefly with advanced cases, therefore with compound curves. They do not show the incredibly greater frequency of the left curves, as do the school reports.

The prophylaxis is discussed by considering seriatim the causative factors. These are held to be:—

1. Improper illumination of school-rooms.
2. Prolonging sitting position.
3. Desks not adjusted to size of children.
4. Improper position of copy-books or paper.
5. Oblique style of penmanship.

These factors are considered in detail and in a very instructive manner, but should be consulted in the original.

The home influences concerning prophylaxis and treatment are given special attention. These concern piano playing, sewing, corset-wearing, and household duties, as well as the same factors considered in connection with the school. He concludes:—

1. Weak and delicate children, and especially rachitic, should not be sent to school too early.
2. All children should be examined for unilateral flat foot and unequal length of limbs before sending them to school, in order to prevent static scoliosis.
3. Questions of illumination, writing paper, and print, should receive proper attention.
4. Adjustment of desks to the pupils should be looked after.
5. Long periods of sitting should be avoided.
6. Positions in writing should be carefully regulated, and fatigue from long-continued effort avoided.
7. Care should be given to the conditions at home, as above indicated.
8. Rules for writing, etc., are given.
9. Private lessons of all kinds after school hours are to be discouraged. Corsets to be forbidden.
10. Gymnastic exercises to be encouraged, and especially play in the open. This is discussed in detail.
11. Medical inspection regarding these points recommended.

In treatment of this class of cases, of mild grade as they chiefly are, the use of jackets and braces is to be deprecated.

The gymnastic treatment is conducted practically upon the Zander principles, and contains no new suggestions.—*A. H. Freiberg, Cincinnati.*

SPINE.

205. Spondylitis Deformans and Ankylosing Spondylitis. By Simmonds. *Fortschr. a. d. Gebiete d. Roentgenstr.*, Bd. VII. Heft 2.

The result of studying three hundred cases. Regarding the intervertebral discs as "bumpers" for the protection of the vertebræ, he ascribes the disease to some damage sustained by them, and resulting therefore in repeated traumatisms of the bone and consequent overgrowths. He has never seen ossifications of the ligaments, nor does he see any reason for dividing the cases into classes according to the involvement of the small joints.

Ankylosing spondylitis is a term which he reserves for a condition produced by ossification of the ligaments and the joints, but without bony overgrowth.

In the same number is an article by Fraenkel on the same subject, in which the view is expressed that it is not feasible to distinguish different *clinical* types of the ankylotic forms of spinal disease. Spondylitis deformans is for him, however, a separate disease, characterized particularly by the deformity of the vertebral bodies and the normal condition of the small joints.

The arthritis ankylopoetica runs a more rapid course, and is of graver prognosis, clinically, than the spondylitis deformans.—*A. H. Freiberg, Cincinnati.*

206. **Neuropathic Spondylitis.** By G. T. Troshin. *Russkii Vratch*, St. Petersburg, No. 20 (commenced in No. 18).

"This comprehensive communication from Bechtereff's clinic reports in detail a number of cases, concluding with a review of the literature on the subject of chronic ankylosing inflammation of the spine. Troshin distinguishes the Bechtereff type as a neuropathic curvature of the spine, while the Strümpell-Marie type is more in the nature of arthritis deformans. In the latter the changes in the spinal cord are similar to what is observed in arthritis deformans, and it should be regarded consequently as a trophoneurosis. Generally speaking, all the various forms of spondylitis may be considered functional affections, free from inflammatory processes. The special features of each type vary with the fundamental cause of the spondylitis."—*R. B. Osgood, Boston.*

207. **Carcinoma of the Spine and Meninges Secondary to Cancer of the Breast.** By F. Savary Pearce, M.D., and A. C. Buckley, M.D., Philadelphia. *Jour. Am. Med. Ass'n,* Feb. 20, 1904, vol. xlii.

A case of carcinoma of the spine and meninges secondary to a mammary carcinoma is fully reported, with the pathological findings at autopsy.

They conclude that pain from the onset is a very characteristic feature of carcinoma of the spine.—*Robert B. Osgood, Boston.*

208. **Bechterew's Disease.** By L. M. Pussep. *Russkii Vratch*, St. Petersburg, vol. ii., No. 32.

Ankylosis of the Spine.—Pussep draws sharp lines of distinction between the Bechterew and the Strümpell-Marie type. In a large table he gives the details of twenty-eight cases of the former, as recorded by various writers, including seven by Bechterew and twelve by other Russian writers, noting the condition of the reflexes, sensibility, muscle atrophy, etc. The article was presented at the Madrid congress.—*Abst. Jour. Am. Med. Ass'n, Feb.* 6, 1904.

209. **Kuemmell's Disease of the Vertebræ.** By Dr. Brodnitz, Frankfort. *Zeit. f. orth. Chir.*, Bd. XII. Heft 1 and 2.

Kümmell in 1891 described a disease of the vertebra where a rarefying process of the bodies of the vertebræ took place, following a greater or less injury of the vertebral column, after many weeks or months, and where there was a loss of substance and evident knuckle formation. Later Kümmell considered this condition, in many of the cases, to be a compression fracture of the bodies of the vertebræ, which view was held by König, Kaufman, Bähr, and others, who considered it might also be a longitudinal crack, and that dislocation first took place from the weight of the vertebral column.

Brodnitz describes a case of a man forty-five years of age, who fell from a scaffold upon his back from a height of three metres, and was unconscious when picked up. There was much exudation of blood in the region of the lower dorsal and lumbar vertebræ. For eight days the patient could not spontaneously pass his urine, although no paralysis existed. The X-ray at this time showed normal vertebræ. Ten weeks later there was a moderate posterior bending of the vertebral column in the region of the injury, which, the patient said, he had had before the injury. X-ray still showed normal vertebræ. The patient complained of pain and stiffness in the back. Two months later there was still pain in the back, which was held rigidly and bent forward slightly. Examination showed a knuckle of the second lumbar vertebra, painful on pressure; and the lumbar region was contracted with spasm. Absolute rest in bed alleviated the pain, and after four weeks it was wholly gone, and pressure over the knuckle gave no pain. Ten weeks later the patient was without pain, but held the spine moderately stiff, and he could leave his bed. The knuckle, by appropriate treatment, had disappeared to a moderate arching backwards, which could be felt and not seen. The patient had become smaller. X-ray at this time showed that the cartilage between the first and second lumbar vertebræ had entirely disappeared, the first lumbar vertebra was much changed in its lower portion, the second lumbar vertebra was greatly pressed together in its length as well as breadth.

Brodnitz considers the cause of the change to be a true bone process, which under the influence of trauma slowly developed, and not a reabsorbed callus; and he thinks it difficult to differentiate between a rarefying osteitis and a trophoneurotic disturbance in this case, and considers it a traumatic disease of the vertebral column, as mentioned by Kümmell.—*David Townsend, Boston.*

210. A Case of Ischæmic Affection of the Spinal Cord in Connection with Tubercular Spondylitis. By Wieting. *Deutsch. Zeit. f. Chir.*, Bd. 70, p. 112.

Report of a case of spondylitis in a boy of eleven years, involving the dorsal region. This came on two years before, after a fall, and within a year from this time a gibbus formed. Abscess followed, and was opened. In spite of steady increase of the deformity the boy was able to walk until one month before the time of observation by the reporter, when marked œdema of both legs and paresis of both lower extremities developed. There was no ankle clonus, and no exaggerated patellar reflex. No disturbance of bowel or bladder. Disturbance of sensibility very slight. Death occurred after operation in consequence of pulmonary embolism.

The autopsy showed that the aorta was kinked to almost a right angle, and that, in consequence of the occlusion of an intercostal artery, a mural thrombus had formed in the aorta below the bend. The compression of the intercostal vessel is explained by the increase of the abscess behind it. The combined effect of this and the aortic kink was to interfere markedly with the blood supply to the lower limbs. The inferior vena cava was not obstructed. The venæ iliacæ were compressed by the descent of pus on either side into the pelvis, and were thrombosed.

It is held that these conditions are to be held responsible for the paresis. In this case the peripachymeningitis externa which was present is held blameless by the author because of slight extent. There was no sign of pressure on the cord. Microscopic examination of the cord is given.

The symptoms are therefore explained by the author as resulting from ischæmia of the cord below the kink in the aorta, and owing its existence in turn to this bend and the thrombosis combined with it.—*A. H. Freiberg, Cincinnati.*

211. Vertebral Tuberculosis, Particularly of the Posterior Segments, also concerning the Origin of Retropharyngeal Abscesses. By Wieting. *Archiv f. klin. Chir.*, Bd. 71, p. 479, 1903.

In the treatment of Pott's disease the more radical procedures, like Calot's redressment, have, as was to be expected, been thrust aside. The value and method of exact fixation has, however, been left as an important lesson learned from it. Many plaster jackets are merely envelopes which impose an additional burden without really immobilizing the spine. Attention is called to the points of support upon which the efficiency of a plaster jacket depends, especially the pelvis and base of the skull. He dwells upon the impossibility of making a truly efficient jacket for some corpulent individuals.

A priori there is no good reason why we should not attack a focus of tuberculous infection if it is accessible, just as we do with the other infectious processes of the bones. The conservative methods, such as iodoform injections, treatment by hyperæmia and plaster dressings, are frequently persisted in until the time for successful operative measures, too, has passed. The results of operative methods will not be considered inferior to those obtained by conservative plans of treatment if the bad functional results of typical resections be ignored, particularly those done before the growth limit. These should not be confounded with the more modern atypical operations in which only the diseased tissue is taken away. In these cases there is really no more epiphyseal tissue lost by the operation than has already been destroyed by the disease.

This argument does not imply that every case of spondylitis should be operated upon. We must distinguish between disease of the bodies (spondylitis anterior) and disease of the arches and processes (spondylitis posterior). Although the posterior form is held by all authors to be rather rare, he has seen it nine times in seventy cases of spinal tuberculosis. These cases, treated for the most part by operation, are reported in detail. Three of these cases presented cord symptoms. The affection of the cord in so large a proportion as this is in contradiction with previous experience, as far as the posterior form of the disease is concerned. Wieting's observations are all made in Turkey, and he has himself called attention to the variation in the types of bone disease seen here as contrasted with what he had seen formerly in Hamburg.

He concludes that operation should always be undertaken once the diagnosis of posterior spondylitis is made. The character of tenderness he considers a most important diagnostic point. Pressure in the axis of the spine produces pain principally in case the bodies are involved: direct pressure to either side of the spinous processes, on the other hand, is more likely to be found in the posterior form of the disease. Indirect pressure is made by pressing gently upon the head of the standing patient.

Great stress is laid upon the appearance of abscess to either side of the spinous processes, as diagnostic of the posterior form. The abscess has but little tendency to spread.

Having been recognized and thoroughly treated, the prognosis of this form is to be regarded as distinctly better than in the anterior form of the disease. He incises in the line of the spinous processes, and, if more room is necessary, lengthens the incision rather than adds transverse cuts, in order to preserve the long muscles as far as may be.

Operation in the common anterior form must be considered differently because of the difference in accessibility of the seat of the disease. It is particularly indicated in those cases in which cord symptoms persist, the spondylitis as such having really run its course. In more recent cases, operation is indicated when the usual conservative methods have failed to relieve the cord symptoms, or even when, in the absence of these, the activity of the disease cannot be arrested in spite of the greatest care. He makes the proposal to assist the cure of the process and strengthening of the weakened column by inserting ivory pegs on the concave side of the gibbus. The spine may be reached by a lateral oblique incision, and one to three ribs resected, together with the transverse and articular processes. The plan seems virtually the same as Menard's costotransversectomy. He reports two such operations, both of which died from pulmonary embolism.

In the treatment of retropharyngeal abscess the incision in front of the sternocleido is recommended for disease of the upper third cervical: below this the posterior incision is preferred. If necessary, the muscle may be divided transversely. If possible, our operations should here, too, approach the seat of disease. Retropharyngeal abscesses are usually the result of tuberculous infection of the glands here situated. This may result secondarily from a vertebral focus, but is without doubt often secondary to disease of the pharynx. If this is true, the glands themselves should be attacked surgically, simple drainage not being sufficient.

BONES AND JOINTS.

212. Actinomycosis or Osteomyelitis? By E. Bergmann, Berlin. *Berlin. klin. Woch.*, Jan. 4, 1904.

Bergmann commences his article with a brief discussion of actinomycosis and its fungus, and mentions several cases from different authors. He describes a case of a man twenty-nine years old which came to his clinic. He was kicked by a horse in 1898, in the region of the left knee. There was swelling and pain in the region of the patella, later on the inner surface of the thigh. In 1902 the lower portion of the thigh began to swell, and also the knee, and there was much pain. In April, 1903, he entered Bergmann's clinic. His left thigh was markedly swollen, sensitive to pressure, there was fluid in the knee joint, patella floated, and there was fluctuation on the outer side of the thigh. In the left inguinal region were three swollen lymph glands. There was no temperature. At first sight it seemed like a case of acute spontaneous osteomyelitis; but Von Bergmann considered it was not osteomyelitis because there were no signs of consequence of osteomyelitis, because the disease did not begin acutely, but had gradually developed, and had run a chronic course. Consequently, he decided it was a case of actinomycosis. X-ray showed the surface of both femora to be smooth, and the left one was thicker than the right. Von Bergmann incised the fluctuating area, and found no free pus, but gelatinous tissue with actinomycotic masses. There was a good recovery. About a month later an abscess developed on the inside of the thigh, which was incised with good recovery. This case was not accompanied, as are so many of the cases of actinomycosis, with a staphyloccus pus formation.—*David Townsend, Boston.*

213. On the Radioscopic Anatomy and Clinical Appearances of Chondral Dysphasia of the Bones with Multiple Cartilaginous Exostoses. By R. Kienböck. *Wien. med. Woch.*, No. 4752.

Nine cases of multiple cartilaginous formation of exostoses with accurate radiographic report. In several of these cases there appeared near the exostosis formation other severe changes of the bone structure (diffuse swellings, curvatures, and shortenings), which Kienböck is inclined to accept as a common congenital disturbance of the chondral portion of the bone (chondral dysphasia).—*David Townsend, Boston.*

214. Elastic Fibres and Bone Regeneration. By Grohe. *Archiv f. klin. Chir.*, Bd. LXXII. Heft 3.

The elastic fibres of adult long bones have their origin in the periosteum, and their presence is to be ascribed to the tendons, muscles, and fascia in the immediate neighborhood, by reason of the pressure and tension stresses made upon the periosteum by them.

This research concerns the behavior of the elastic fibres in cases of experimental fractures, in a few recent human fractures, and in a number of amputation stumps

The following are the conclusions:—

1. The production of new elastic fibres in and on regenerating bone depends upon the action of external mechanical influences.
2. The adaptation of these fibres depends upon the regional position and anatomic character of the bone.

3 The first new formation of elastic fibres is observed after four weeks, and after nine months there may be complete *restitutio ad integrum*. His preparations furnish no explanation of the histogenesis of the elastic fibres.

5. The stage of cartilage formation has been definitely determined in the callus of rabbits and man.—*A. H. Freiberg, Cincinnati.*

215. **Experiences with the Iodoform Plug for Bone Cavities.** By Von Mosetig-Moorhof. *Deutsch. Zeitschr. f. Chir.*, Bd. LXXI. Heft 5–6

The material used is a mixture of finely powdered iodoform 60.0, oil of sesame and spermaceti, each 40.0. This mass, which is stiff at ordinary temperature, becomes fluid at 50 C. It must be thoroughly shaken before using.

In using it, care must be taken that it thoroughly covers every part of the wall of the cavity and that it penetrates into the smallest crevices. Of especial importance, however, is the absolute dryness of the wound. This is accomplished by a stream of hot or cold sterilized air. The greatest care must also be taken that every particle of diseased tissue has been removed.

The finer details of the method must be studied in the original. The indications for the use of the method are chronic and circumscribed osteomyelitis, chronic bone abscess, and necrosis resulting from acute osteomyelitis.

The author describes in detail the operations for these different conditions in the various regions of the body. There follows the report of 83 operations for osteomyelitic conditions, 108 for tuberculous disease, and 8 others not belonging in these groups.

Skiagraphs accompany the paper, showing the plugs in place and their ultimate replacement by new tissue.—*A. H. Freiberg, Cincinnati.*

216. **Hypertrophic Osteoarthropathy, with Report of Two Cases.** By Theodore C. Janeway, M.D., New York. *Am. Jour. Med. Sci.*, October, 1903.

Janeway reports two cases of this rare disease,—both associated with purulent bronchiectasis,—illustrated with photographs and skiagrams.

Following the report of these cases is a review and analysis of the cases reported previously; and the subjects of etiology, pathology, and complications, are fully discussed.

An extensive bibliography is appended.—*John L. Porter, Chicago.*

217. **The Preliminary Report of a Series of Metabolism Observations Made in Atrophic Arthritis, Hypertrophic Arthritis, Osteitis Deformans, and the Normal.** By Joel E. Goldthwait, M.D., Charles F. Painter, M.D., and Robert B. Osgood, M.D., Boston, Mass. *Am. Med.*, April 2 and 9, 1904, p. 547 and 590.

These investigations were made by Mr. F. H. McCrudden in the physiological laboratory of the Massachusetts General Hospital under the direction of the writers, to obtain more accurate knowledge of the etiology, pathology, and treatment of the so-called rheumatoid conditions. The authors first define the three diseases, to avoid any confusion from misunderstanding of terms. In the atrophic form, or rheumatoid arthritis, the most marked features are the increase of normal joint fluids and infiltration of the periarticular structures. The joint proper with its cartilages shows atrophic changes very early; and, as the swelling is absorbed, these parts become smaller than normal. The hypertrophic, or osteoarthritis, presents the features of joint enlargement, and but little or no change in the periarticular structures. Much dependence is placed upon the revelations of the X-ray to establish the differential diagnosis of these cases. Osteitis deformans causes but little joint alteration, but manifests itself chiefly in the thickening and bowing of the shafts of the bones. The authors seem to consider the first two affections peculiar to adult life; but such is, unfortunately, not the case, as children have been not infrequently seen who suffered in the same manner.

A short review of the recent literature of these conditions then follows, together with the description of the methods of investigation and details of the chemic work. No conclusions follow the description of the experiments, as the number is too small; and the hope is that other investigators will pursue the subject still further, as the authors also purpose doing.—*J. T. Rugh, Philadelphia.*

218. A Case of Multiple Bone Cysts. By Dr. H. Heineke. *Beiträge zur klin. Chir.*, Bd. 40, p. 481.

In this case there existed rheumatic pains in the right hip and thigh, which after lasting four weeks culminated in a spontaneous fracture of the right femur while the patient was standing. An incision down to the femur revealed a cavity, the wall of which was so thin that the knife went through it with ease. It was as large as a hen's egg, and was filled with a thin brown fluid. The inner surface of the wall was smooth, and looked like serous membrane. The limb was encased in plaster of Paris, union occurring after nine months. Subsequently the patient had pain in the upper end of the right humerus, where the radiograph showed the presence of another cavity. Several other cavities were detected after a systematic X-ray examination.

A microscopic examination of the cyst wall shows three distinct layers. An inner made up of connective tissue with no epithelial lining. Here and there about the vessels of this layer pigment exists. The middle layer is 1 mm. thick, and is made up of fine trabeculæ, which have become decalcified. These trabeculæ are lined by a layer of osteoblasts.

The patient two years after the onset of the trouble still complains of pain about the bones, but is in good condition. After a consideration of the various theories regarding bone cysts, H. gives the following classification:—

I. Solitary cysts resulting from local conditions:—
  (*a*) Degenerated enchondromata.
  (*b*) Degenerated sarcomata.
II. Cyst formation resulting from general involvement of the bony skeleton.
  (*a*) Cystic formation involving the whole skeleton.
    (1) With chondroma formation.
    (2) Without chondroma formation.
  (*b*) Cysts arising during osteomalacia.
  (*c*) Cysts arising during osteitis deformans.

The author believes that his case is a general disease allied to the osteitis deformans of Paget, whose manifestation is the cyst formation; and he considers it identical with Engel's case.—*Carl Hiller, Cincinnati.*

219. Wire Joints. By G. Pascale, Naples. *Riforma Medica*, Palermo, No. 51 (commenced in No. 48).

Pascale illustrates a case of a new shoulder joint reconstructed with wire after extirpation of the head of the humerus on account of sarcoma. Also a wire hip joint inserted on account of subluxation and badly consolidated fracture of the neck of the femur. He also reviews the experiences of others in this line, and concludes that there is a promising future for such operations. It is possible by this means to reconstruct a joint with loops of wire. They are perfectly tolerated by the tissues, even when the excursions are quite extensive. The wire not only fastens the bones together, allowing normal function of the parts by the new joint, but maintains the normal outline of the parts, and thus favors muscular function and prevents atrophy. It also promotes the formation of new bone and regeneration of the tissues, directing and shaping the neoformation according to the normal type. He finds platinum the best metal for the wire, as it is extremely malleable and resistant. He prefers a double wire rather than a single wire of the same strength and size. The loop should be introduced to stay permanently, with no idea of removing it later. He gives cuts of his patients, one standing on and flexing the leg in which the hip joint is one of these wire ones. It is almost impossible to detect any difference between the aspect or functioning of the two sides. The results of such operations to date, although the number is very limited, are strong testimony in their favor. The literature on the subject is reviewed.—*Abst. Jour. Am. Med. Ass'n, Feb.* 20, 1904.

220. A Study of Gonococcus Metastasis, with Report of a Case. By James McColgan, Grass Lake, Mich., and James Cooper, Ann Arbor, Mich. *Jour. Am. Med. Ass'n*, vol. xlii., April 2, 1904, No. 14, p. 877.

The article contains a somewhat extensive review of the literature on the subject, and the report of a case of purulent teno vaginitis of the hand. Bacteriological examination demonstrated the suspected diplococcus of Neisser. The authors, in the light of the fact that such metastatic abscesses due to the gonococcuus alone can occur in various parts of the body, urge the importance of routine examination of pus from such abscesses, especially those connected with the tendon sheaths and joints.

They point out the danger to the families and associates of these patients due to ignorance of the true nature of such conditions, and emphasize the fact that a proper diagnosis would direct the treatment.—*Robert B. Osgood, Boston.*

221. Acute, Subacute, and Chronic Infectious Osteomyelitis: Its Pathology and Treatment. By Edward H. Nichols, M.D., Boston. *Jour. Am. Med. Ass'n*, vol. xlii., Feb. 13, 1904, No. 7.

Introduction.—The author states that the objects of the paper are to describe the sequence of changes in infectious osteomyelitis, to emphasize the different pathological conditions that exist during the different stages, and to suggest the appropriate operative measures in the light of the pathology. The statements are based on personal work, both clinical and laboratory.

The process in an infectious osteomyelitis is essentially like that seen in a furuncle; but, beginning in bone marrow, it is surrounded by the dense shell of the cortex, and may quickly involve the whole medullary cavity.

The organism most frequently the cause is the staphylococcus pyogenes aureus. The streptococcus and pneumococcus are most apt to affect the joints and to cause a superficial bone lesion.

The lesions of the typhoid bacillus are usually of small extent and superficial.

As a rule, the organism is found in pure culture. The cases of mixed infection are usually very severe.

The disease occurs oftenest before the bones have fully developed, and in boys three times as often as in girls, almost always beginning in the diaphysis near the epiphyseal line, in the marrow.

Very extensive necrosis of the marrow may occur. The process extends quite early through the dense cortical bone, producing a suppuration beneath the periosteum. The cortical bone necroses externally in proportion to the amount of periosteum stripped off and internally to the amount of endosteum destroyed. If both are affected at the same time, complete necrosis of that portion of the shaft occurs.

For a better understanding of the repair process the author describes in detail, with illustrations, the process of repair in normal bone, and then that in osteomyelitis. The gross appearances at different stages of marrow, cortex, periosteum, and soft tissues, are treated very fully.

Under the head of symptoms the typical train is discussed, and the frequent inaccurate diagnosis condemned, recognizing, however, that many cases are a typical and the diagnosis often difficult. The diseases most frequently mistaken for osteomyelitis, the author states, are early acute tuberculosis of joints, acute articular rheumatism, gonorrheal rheumatism, and typhoid fever.

The *treatment* differs in the acute, subacute stages, and chronic stages. In the acute stage, absolutely free drainage, without curettage of the marrow, so that the endosteum may be left intact. Interfere with the epiphyseal line as little as possible. In the subacute stage with extensive necrosis, the removal of the entire area of necrotic bone is alone efficient.

The chief object of the article is to emphasize and illustrate the fact that by proper methods very remarkable and functionally perfect results may be obtained.

He discusses the methods for the repair of bony defects, and speaks enthusiastically of the work of Ollier.

The author's theory is given, and the technique of the operative procedures is described. The points of difference from the old operative methods are emphasized, and the *rationale* of the new clearly demonstrated. The treatment in the chronic stage is carried out in accordance with the same essential laws of growth and repair,

There follow reports of ten cases, with numerous photographs and skiagraphs, illustrative of the new methods of operation and the processes of repair.

The conclusions are carefully epitomized, and cannot well be abstracted, but should be read in full.

The article represents a rare combination of trained pathological study with large clinical experience, and would seem to revolutionize operative methods, with the promise of far more perfect results in the future.—*Robert B. Osgood, Boston.*

222. **Tubercular Joints and their Treatment.** By David C. Peyton, M.D. Jeffersonville, Ind. *Jour. Am. Med. Ass'n*, vol. xlii., No. 7, Feb. 13, 1904.

The author urges the necessity of early diagnosis. He holds that at first joint tuberculosis is a local process, originating in the synovia or in the bone. It is a bacillary infection, which, if the joint is in a healthy condition, is thrown off. The predisposing causes and the cardinal symptoms are discussed. Tuberculin is considered by the author to be "a most certain agent in rendering the diagnosis possible."

He contends that the older methods of fixation, fresh air, rest, etc., should only be employed for a short time, and that surgical measures, consisting of free incisions and frequent saline irrigations in the early younger cases and more radical operations in the advanced and adult cases, are always demanded.—*Robert B. Osgood, Boston.*

223. **Differential Diagnosis of Rheumatism and the Arthritis.** By Thos. F. Harrington, M.D. *Boston M. & S. Jour.*, Jan. 28, 1904.

The author gives a very clear presentation of the points of differentiation between the various forms of arthritis. His remark, that "no one term in medicine is accountable for more ignorance and neglect than "rheumatism," is the keynote of the refrain carried through the article. He insists that the term "rheumatism" should be confined to acute, inflammatory rheumatism, and shows conclusively that that form of arthritis furnishes a very small proportion of all the various forms that are often carelessly diagnosed as "rheumatism."

The classification of the different kinds of arthritis is excellent, and conforms to our best pathological teaching, as well as to clinical experience.

The use of the terms "arthritis deformans" and "osteoarthritis" as indicating very different pathological conditions is commendable, and the clinical differences are very well shown. Some of the forms mentioned might have been more fully dwelt upon with benefit. It is doubtful if there is a distinct "senile arthritis" that would not pathologically fall into one of the other classes described. An arthritis to deserve the name must be something more than a "stiffness or soreness."—*John L. Porter, Chicago.*

CONGENITAL DISLOCATION OF THE HIP.

224. **Contributions to the Treatment of Congenital Dislocation of the Hip.** By Reiner. *Central. f. Chir.*, No. 2, 1904.

Recommends Schanz's manœuvre for the reduction of cases otherwise beyond the age limit. This consists in fixing the limb in that position in which the head ordinarily slips into place, when the first effort at reduction has failed. It is held there under pressure by a plaster dressing for three to four days, after which the attempt at reduction is repeated. By this means he has succeeded in replacing hips of patients up to twelve years, in bilateral, and up to fifteen, in unilateral cases. This, too, without serious trauma.

In these older patients R. proceeds to the operation without the intention of completing it in one sitting. Lorenz's usual method is begun, and stopped when the head is presumed to be against the isthmus of the capsule. In this position it is held by plaster for eight to fourteen days, and then the completion of the reduction is attempted. His successful cases required no more than two attempts.

He believes that the method acts by the continued effect of muscular tension, aided, perhaps, by the œdematous softening caused by the trauma.

The second theme of his paper concerns the after-treatment. To prevent reluxation upwards and forwards, it is important not to attempt to overcome the stiffness in adduction too soon. For this reason, motion is encouraged at first in the frontal direction only. For the same reason, while permitting active and passive gymnastics during the day, he holds the patients in the so-called primary position at night by means of a plaster shell made similarly to Lorenz's well-known plaster bed. In this the maintenance of the hyperextension is held to be of great importance.—*A. H. Freiberg, Cincinnati.*

25. **Report on Two of the Children Operated on by Lorenz.** By Harry M. Sherman, M.D., San Francisco. *Jour. Am. Med. Ass'n*, Feb. 27, 1904, vol. xlii., No. 9.

In neither of the cases was a successful or beneficial result obtained. In both cases, one confirmed by subsequent open operation, the capsule had been torn on the distal side, the head thrust through, and the remaining capsule stretched across the already shallow acetabulum. The head, by palpation, was found in both to be in the outer part of Scarpa's triangle and very close under the skin. The trochanter was internal and posterior.

In the second case, allowed to take its course after the removal of the plaster, there was no improvement in the gait, and probably more shortening than before the operation.

The article is illustrated by skiagraphs taken directly after the removal of the plaster applied by Lorenz and before any manipulation, and also those showing the end results.—*Robert B. Osgood, Boston.*

226. **The Diagnosis and Treatment of Congenital Misplacement of the Hip in Infancy.** By Albert H. Freiberg, M.D., Cincinnati, Ohio. *Am. Med.*, March 5, 1904, p. 394.

Free discussion of congenitally misplaced hips during the past few years has assigned certain definite symptoms to the condition, and this has created the impression that the diagnosis can be easily made from the gait and shortening. Freiberg calls attention, however, to the fact that there may be no limp for several years because of certain joint conditions, and that certain rachitic changes in the femoral neck or in the spine may give rise to the same changes in the gait and posture. There exists in some cases a predisposition to luxation, in that there is an obliquity of the "roof" of the acetabulum. There is also some disparagement between the two bony structures forming the joint, but in all of these cases there is no luxation so long as the child does not walk or place his weight on the part. With the use of the leg, however, and the assumption of normal function, dislocation occurs. He also emphasizes the importance of the radiograph in determining the normality of the two hips and of the component parts, but believes it does not give so accurate a prognosis of results of treatment as does "the behavior of the joint under manipulation of the joint upon the operating table. Stability of reduction here argues for the success of the operation and *vice versa.*" He reports a case of delayed attempts at walking in a child seventeen months old. Slight shortening of one leg was present, but on account of fat the trochanter and head could not be made out. The radiograph showed slight luxation with alteration of acetabulum "roof," and reduction was performed. In three weeks the child began attempts at walking, and has constantly improved, until now there is no limp at all, and the obliquity of the acetabular roof is disappearing.—*J. T. Rugh, Philadelphia.*

HIP, DISEASES AND INJURIES.

227. **Hygroma of the Bursa Trochanterica Profunda.** By Dr. Oscar Lippert. *Beiträge zur klin. Chir.*, Bd. 40, p. 503.

The article begins with a detailed consideration of the anatomy, it stating that the bursa trochanterica profunda is either a unilocular or multilocular sac measuring 2-4 cm. by 4-6 cm. to the external and outer portion of the trochanter major of the femur. The bursa may communicate with others situated about the hip. The condition is often tuberculous, and may be preceded by some trauma. The affection may be primary or secondary to tuberculosis elsewhere, as in the hip.

The wall of the bursa becomes thickened, and there may be formation of villi on the interior. The sac is distended with fluid, in which rice bodies are often found. As a rule, there are no special subjective symptoms except the complaint of fulness or stiffness. An examination reveals a soft fluctuating or hard mass, depending on the amount of distention. When crepitation can be felt, the rice bodies are present. The skin is movable over the swelling. The tenderness and sometimes pain is relieved in the patient by flexion, abduction, and external rotation of the extremity. These symptoms make it possible to mistake this condition for coxitis. Pressure on the heel is not painful, as in coxitis. Furthermore, the patient can bear the body weight on the limb without pain. From a tubercular osteitis of the trochanter the differential diagnosis would be difficult. The prognosis is good when the hygroma is excised *in toto*, which should be the normal treatment for all cases. When this is impossible, incision and scraping away the sac wall may be tried.—*Carl Hiller, Cincinnati.*

228. **Etiology of Coxa Vara.** By Borchard. *Archiv f. Orthopædie,* Bd. I. Heft 3.

Coxa vara is not to be regarded as a disease, but as a symptom complex, which may be produced by various causes, resulting in deviations in the form of that part of the femur between the trochanter major and pelvis.

The causes for these changes brought forward by him do not differ materially from those discussed in the recent literature of the subject. He mentions one case of interest, in that syringomyelia seems to have been the cause of the bone softening which permitted the bend to take place.

There are no new suggestions as to treatment.—*A. H. Freiberg, Cincinnati.*

229. A Contribution to the Etiology of Coxa Vara without Symptoms. (6 illustrations.) By Dr. Froelich. *Zeit. f. orth. Chir.*, Bd. XII. Heft 1 and 2, Boston, Jan. 30, 1904.

Dr. Froelich discusses briefly coxa vara since its discovery by Muller in 1888, and considers that to-day there is a symptomatic and an essential coxa vara. The essential coxa vara has such characteristic signs as germ valgum, adolescentium and pes-planus valgus. He describes the appearance of the symptomatic and the essential coxa vara as shown by the X-ray.

In the last year Froelich has examined all his cases of essential coxa vara bacteriologically, and he describes in full three cases. In two of these cases, cultures of staphylococcus albus were found. In the third case the examination was negative. He mentions two other cases, without coxa vara, one a boy of fourteen years, on whom an osteotomy for genu valgum adolescentium was done, and a culture of staphylococcus albus was obtained from a piece of the femur. He also obtained a culture of the same coccus from the navicular of a boy of thirteen, after a reduction of pes-planus valgus. In another case, which was operated on for old flat foot, no culture was obtained.

Froelich wonders if the cases of coxa vara adolescentium, as well as those of germ valgum adolescentium, pes-planus valgus adolescentium, and perhaps also scoliosis, should not be considered as chronic osteomyelitis without temperature, or, still better, osteoarthritis osteomyelitica, in which the white staphylococcus is the infecting element instead of being due to late rickets.

He emphasizes the fact that, in order to facilitate the search, the examination should be made only in the active stage of the disease, because then a positive result may sooner be obtained, and that the bacteriological examination must be a thorough one.—*David Townsend, Boston.*

230. Rubio's Gluteal Reflex: New Sign of Hip Disease. By O. Acevedo. *Semana Medica*, Buenos Ayres, x., No. 6.

The reflex mentioned is constant in case of incipient inflammation in or around the joint, but is never observed in hysteric or purely neuralgic affections. When percussion is applied with the fingers over the surface corresponding to the gluteus maximus, the gluteus and posterior muscles twitch as with an epileptoid tremor. The sign is most pronounced when percussion is applied at the point where the nerves pass through the sciatic notch, also along the course of the greater sciatic nerve. This phenomenon will invariably differentiate an inflammatory process from a purely nervous or hysteric affection. Acevedo has named this sign after the late Professor Rubio, as a tribute to his memory.—*Abst. Jour. Am. Med. Ass'n, Feb.* 20, 1904.

231. Juvenile Osteoarthritis of the Hip Joint. By Von Brunn. *Bruns' Beitr. z. klin. Chir.*, Bd. XL. p. 650.

Attention is called to the occurrence of this condition in youthful patients and to its clinical similarity to some cases of coxa vara. The case report is very interesting, and is accompanied by radiograms.

After detailed discussion of the clinical aspects of the disease the author draws the following conclusions:—

1. An arthritis deformans of the hip corresponding to the malum coxæ senile occurs in youth also. It is found in both sexes, either unilaterally or bilaterally.

2. Trauma is not to be considered as important etiologically as hitherto. The final cause of the disease is as yet unknown.

3. In the nature of the thing the symptoms will vary greatly according to the shape of the joint surfaces. They may resemble those of coxa vara very closely.

4. The limb is found most often in external rotation. Rotation inwards, abduction, and flexion may, however, be found, and in various combinations.

5. Limitation of motion may be of high degree, and may cause great impairment of function. Motion in any direction may be involved. Abduction and adduction, as well as rotation, are always somewhat limited; flexion, less often; and extension, still more rarely. Variation of the amount of rotation, according as it is tested in flexion or extension, seems to be especially characteristic.

6. Expectant treatment is indicated, to begin with. Temporary recumbency in the best possible position may be of advantage, especially when joint irritation is present. Exercises tending to antagonize the faulty position are, however, most important. Resection is not to be considered except when absolutely unavoidable.

KNEE.

232. On the Significance of Fat Tissue in the Pathology of the Knee Joint.

(1 illustration.) By Professor Dr. A. Hoffa, Berlin. *Deutsch. med. Woch.*, March 3–10, 1904.

Fat tissue has been described in the pathology of the knee joint, the lipoma arborescens of Müller and solitary lipoma of König. Hoffa thinks that the solitary lipoma rarely occurs, and that many of the cases described as knee-joint lipoma are in reality an inflammatory fibrous hyperplasia of the intra-articular fat tissue. He describes the appearance of the normal tissues of the knee joint, lying behind the ligamentum patellæ and the normal fat tissue, as well as its microscopical appearance. This normal fat tissue may occasionally, under the influence of trauma, come to an inflammatory hyperplasia. There develops on both sides of the ligamentum patellæ a thick compact clump of fat, giving the appearance of a lipoma. The size, color, and consistency, which he describes, differentiates it from normal fat tissue. He also describes its appearance on cross section and its pathology, and concludes that the disease is a very characteristic one which we can best designate as inflammatory hyperplasia of the fat tissue underneath a growing through of the fat tissue through a compact fibrous connective tissue. He describes the changes in the tissue that lead up to this condition, and considers that the trauma may arise within the joint, as a result of the tearing off of a semilunar cartilage, or by the existence of a free body in the joint, as well as external to the joint. He describes the ordinary course of the disease. There is usually some trauma, a fall upon the knee, or a severe push against the foot, or also a twisting of the lower leg occurs beforehand, so that severe pain in the knee is occasioned. The joint is not especially swollen, and there may be evident a slight bloody exudate. After rest, massage, and ice application the first attack, as a rule, passes off. Pain on walking nevertheless persists; and, as in the attack, the pain is on the inner side of the joint. In addition, disturbances of function in the joint exist. In one case it will be that the knee cannot be properly bent, and in another backward bending of the knee is impossible. Occasionally the joint remains suddenly stationary in the flexed position, and can then only with pain and with greater exertion be straightened. There is more or less atrophy of the quadriceps and a typical swelling of the knee joint, which is situated closely below and on both sides of the patella. It is a pseudo-fluctuating swelling, which causes the ligamentum patellæ to bulge forward. The recesses above the joint, as well as the clefts on the side, remain free. But, as soon as one examines the portion laterally near the patella, he feels the doughy swelling which lies under the ligamentum patellæ. Naturally, a comparison of both knees is always necessary. If the patient forces his knees backward, the marked swelling on both sides of the ligamentum patellæ will be evident. For the rest the joint is wholly intact. There is usually normal movement, and on movement there is felt by the hand laid over the joint a slight creaking, which is quite different from the rough crepitation which one feels in the changes of the cartilage. The joint is almost always intact, which will differentiate this condition from dislocated semilunar cartilage, tearing off of the semilunar cartilages, and the presence of free bodies in the joint. Hoffa describes in full eight of his cases, and advocates, first, after the diagnosis is made, the use of moist applications, compression bandage, massage, and wrapping up of the joint to relieve pain. If this fails, then extirpation of the fat mass through a long incision on the inside of the joint is to be employed. He strongly counsels strict asepsis and working with sterilized forceps and scissors, and under no circumstances should the fingers be introduced into the joint. For the first twenty-four hours only, he uses a strip of gauze laid in the joint to absorb the secretions and blood. After eight to ten days he removes the stitches, and immediately commences active movement of the joint. The patient is kept in bed eight to ten days, and is then massaged and given gymnastics. It takes from six to eight weeks before he regains complete use of the limb.—*David Townsend,* Boston.

233. **Two Cases of Unusual Knee Trauma Treated by a New Orthopedic Apparatus.** By Vogel. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

Two cases are reported in which, as the result of injury, there was found subluxation of the tibia backwards, and in which there was assumed injury to the crucial ligaments.

They were both treated by an apparatus which is given in illustration, and which consists of a leather socket for both thigh and leg, with a joint at the knee which is best explained by the cut, and which seems well adapted for the purpose.—*A. H. Freiberg, Cincinnati.*

234. **Lipoma Arborescens Tuberculosum of the Knee Joint.** By Charles G. Levison, M.D., San Francisco. *Jour. Am. Med. Ass'n,* vol. xlii., Jan. 23, 1904, No. 4.

Dr. Levison reports a case in which the diagnosis of hydrops tuberculosis with synovial involvement was made. The subsequent operation revealed about 120 cc. of clear yellowish serum and a mass of myriad villi springing from the post-patella bursa, and on outer side having the bursa of the quadriceps as the basement membrane. The joint was freely laid open by a transverse incision across the quadriceps above the patella, and the mass dissected out, the ends of the muscle united with catgut, and the leg put up in plaster with small gauze drainage.

Six months later the patient could bend leg to a right angle, and walked without a cane except for long distances. Microscopic examination furnished the diagnosis of lipoma arborescens tuberculosum. No tubercle bacilli were found.

The literature is reviewed.—*Robert B. Osgood, Boston.*

235. **A Method of Treatment of Bilateral Genu Valgum Adolescentium.** By Milo. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

The author has tried to unite the virtues of the two methods of forcible correction, that in one sitting and the method of Wolff in several sittings, by the use of the parallelogram compound lever. A screw being used to approximate the diagonal angles, the other diagonal angles are thereby separated. The instrument is very well shown in the illustrations. It is applied to the inner surfaces of the knees with the long diagonal parallel to the legs, and so that the concave pads with which the short diagonal is provided engage their inner surfaces. The thighs are bound together, as are the ankles, by means of stout bandages. When the long diagonal is now shortened by means of the screw, the knees are separated, and to any desired degree. The operation being done under anæsthesia, the correction can usually be accomplished in one sitting. Plaster is applied while the apparatus is still in place, the latter being removed after it has well set. Hinges may be used in the plaster dressing or not. The compromise between the methods lies in the preliminary treatments which the author gives by means of the apparatus and upon which he lays great stress. The method has given the author uniformly good results.—*A. H. Freiberg, Cincinnati.*

SHOULDER.

236. On the Question of an Etiological Significance of the Defect of the Trapezius for the Elevation of the Scapula. By H. Neumann. *Wien. klin. Woch.*, No. 36.

Neumann considers, on the ground of one of his observed cases of defect of the trapezius, that this defect was not a cause, but only an accidental accompaniment of congenital elevation of the shoulder.—*David Townsend, Boston.*

237. On Acquired Elevation of the Scapula. (5 illustrations.) By Paul Manasse, Berlin. *Berlin. klin. Woch.*, Dec. 21, 1903.

Manasse comments briefly on the cases of elevation of the scapula found in the literature, those from Eulenberg in 1862 and 1877, and Noré-Josserand in May, 1900.

He describes a case of a nineteen-year-old girl who came from a psycopathic family, but she herself had no mental disease. In June, 1900, she had a severe attack of joint rheumatism. About a year later she noticed that the right shoulder was elevated. In May, 1901, the condition was as follows: The right scapula stood noticeably higher than the left, but both scapulæ were of equal size and shape. There was a tonic spasm of the rhomboideus and levator anguli scapuli, with a secondary weakness of that portion of the trapezius and serratus magnus which antagonized these, which had produced this elevation of the scapula. There was no improvement after a year's treatment with resisting gymnastics, massage, electricity, and apparatus. Then Manasse cut the trapezius at the border of the scapula at its middle portion, the rhomboideus from the scapula, and freed the inner, upper angle of the scapula, whereby the connection of the lev. ang. scap. with the scapula was also freed. The result was good. Six weeks later, owing to the growing together of the stumps of the lev. ang. scap. and rhomboideus, the former condition returned. Then both muscles were resected for a distance of 5 cm. After this operation a clonic contraction of these muscles appeared, which drew the scapula upwards and outwards, and which later again disappeared. The result of the operation was good. Eight days later clonic contractions, as after the last operation, appeared, and of both pectorals as well. This condition was bettered by gymnastics. Later a third operation was done, the whole levator was extirpated, and the clavicular portion of the pectoralis major was separated and the pect. minor cut at the coracoid process. After this no improvement. In the next year the patient had a maniacal attack which lasted only a short time, and after this there was gradual improvement; and at present the condition and position of the right scapula is almost perfect. Manasse thinks this case lies on the border line between neurology and surgery, and closes his article with a general consideration of the cause of these spasms. He concludes that, when the acquired elevation of the scapula is due to a tonic contraction of those structures that elevate the scapula, internal treatment should first be tried, and only when this is refused, can cutting, as well as resection and extirpation of the affected muscles, lead to a lasting removal of the condition.—*David Townsend, Boston.*

238. A Case of Congenital Elevation of the Scapula and a Classification of the Cases hitherto Reported. By Hibbs and Loewenstein. *Archiv f. Orthopaedie*, Bd. II. Heft 1.

A case of congenital elevation of the scapula in an adult, in which a bony process from the scapula articulated with the lower cervical spine. No treatment was instituted. The classification proposed is:—

I. Cases with a bony connection between scapula and spine.
II. Those with absence of one or more muscles of the shoulder girdle.
III. Cases with a long supraspinal process bent forward from the scapula.
IV. Those without bony outgrowth, with normal or small scapula, and with shortened or otherwise defective muscles.

The list of cases seems fairly complete with the exception of one reported by the present reviewer (*Annals of Surg.*, May, 1899), in which attention was first called to the cases of McBurney and Sands.

There are no new suggestions regarding etiology or treatment.—*A. H. Freiberg, Cincinnati.*

FOOT.

239. The Treatment of Club-foot. By Ghillini. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

A review presented to the Fourteenth International Congress. It is largely historical in character. Interesting is only his plan of doing the Phelps operation, if correction with the hand has not been successful by the end of the first year.—*A. H. Freiberg, Cincinnati.*

240. The Morphology of the Foot Skeleton. By Lazarus. *Morpholog. Jahrb.*, Bd. 24, Heft 1.

With the highly developed brain, the foot is to be regarded as the main characteristic of the human type. Whereas the coarser functions of hand and foot are united in the upper and lower extremities of the primates, a complete separation of these functions has occurred in man. Although the foot of man and monkey are built on the same general principles, nevertheless certain important differences of form are evident, which are to be regarded as the products of differing functions. The foot skeleton has, as the result of its use as a support, undergone modification in its structure which differentiates it markedly from the anthropoids. The question is put whether this difference exists to the same degree in the early periods of human development as in the adult. He discusses the forms of the human foot skeleton, its development, its relation to lower conditions. He shows that the forms and dimensions of the foot bones, the joint surfaces, the mobility of the joints, and the whole mechanism of the tarsal joints differ fundamentally in the fœtus and new-born from those of the fully developed individual. The comparison with the foot bones of the primates reveals many similarities which point toward a relation with the lower condition. A parallel exists between the supinated position of fœtus and new-born and the foot positions of the primates. This is defined in precise terms. The apelike mobility of the toes in the new-born, and especially the abduction of the great toe, are striking.

In the second part there are treated the dimensions of the foot skeleton and its component parts, in primates and man, from the embryonal period to the completion of growth. These investigations show many striking characters which man, in his early developmental stages, has in common with the gorilla; in addition, the relations of the gorilla to the other primates. The gorilla is farther removed from the orang, in this connection, than from the fœtal or even, in some regards, adult man. The most important cause in this is the increase of static function resulting from the erect position, on the one hand, and the loss of function by absence of grasping, on the other. This is accounted for by the development of the tarsal region and the reduction in size of the toes. In the fœtus the tarsus shows comparatively less development than in the adult. The toes are proportionately long. Here lies the greater similarity in its foot to that of the gorilla than the foot of the human adult.—*Abst. Zeit. f. orth. Chir.*, xi., 3.

241. The Normal and the Flat Foot. By Engels. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

An endeavor to show that many of the prevailing views regarding the anatomy and physiology of the foot are based upon fallacious premises,—that, for example, there is no longitudinal arch to the foot. Attempts hitherto made to study the physiology and pathology of the foot by means of the X-ray have been of little value because of imperfect technique. This requires a constant position of the foot, of the tube, and the possibility of changing the plates without disturbing either foot or tube. He has constructed an apparatus by means of which this is possible. He has thus been able to take accurate measurements of the foot at rest and under weight, as well as to study the structure of the bones. The weight-bearing power of the foot lies in the muscles both of foot and leg. It must be looked upon therefore as a living unit in order to obtain trustworthy results.

Attention is first directed to the internal structure of the bones in the belief that, just as the arrangement of the spongiosa depends upon the degree and direction of the stresses which the bone has to bear, so the study of the internal structure may be expected to give a clew to the amounts and directions of such stresses.

The study of this brings him to two generalizations:—

1. Wherever pressure stress is evident, a rectilinear arrangement exists, and without regard to the limits of individual bones.
2. These pressure bundles are always placed perpendicular to their respective joint surfaces.

Conclusion: the spongy structure is found arranged in the lines of force, the joint surface at right angles to them.

The impression of the prevalence of rectilinear arrangement is given by two systems of trabeculæ which monopolize the side view of the foot skeleton and which cross at right angles in the trochlea of the astragalus. The strength of these systems tells that they are the principal weight-bearers. Their direction shows the manner in which the weight is distributed. The longitudinal arch of the foot is an arch only in the sense of outward appearance, not in function. This appearance is produced chiefly by the bony ridge along the middle of the lower surface of the calcaneus. This has, however, no pressure function, but, on the contrary, one of tension, principally as the insertion of the long plantar ligament. The few groups of curved lines to be seen in the foot are quantitatively and qualitatively so insignificant that he holds it impossible to recognize a "structural" longitudinal arch. The only arch structures in the foot are within the limits of individual bones, and are strictly local in significance.

Important and interesting as they are, it is impossible for us to follow the author through his examination of the structure of the various bones; but we give his summary on account of its importance:—

The foot is a system of rectilinear buttresses which are maintained in their mutual positions by the muscles and ligaments of the sole. We may distinguish a principal and an accessory system, which are not, however, opposed functionally, but are compensatory. The anterior spreads into the metatarsal heads, the posterior into the tuber calcanei. The anterior principal system, which corresponds in a general way to Lorenz's inner arch, is composed of the first three metatarsals, the cuneiform bones, the scaphoid, head of the astragalus, and its neck. It is entirely rectilinear. The anterior accessory system corresponds partly to Lorenz's external arch, and comprises metatarsus IV. and V., the cuboid and os calcis to the posterior joint surface. Its rectilinear character is disturbed by pressure effects coming from the main system, but *it does not constitute an arch.* The main and secondary anterior systems are united in the form of a transversely concave furrow, which is maintained by muscular action and by the concentric effect of the burden itself. The posterior buttress, extending from the trochlea of the astragalus to the tuber calcanei, is complicated by the insertion of a supination joint between talus and calcaneus. This necessitates an anterior support for the calcaneus, and therefore an internal system of pressure and tension trajectories. The posterior and main anterior buttresses meet in the trochlea of the talus, posterior and accessory anterior buttresses just below the posterior calcaneus joint.

There follows a description of the measurements taken by means of the X-ray of the foot in its unburdened and weighted condition. It is impossible to abstract this portion: it is a matter of detail. His conclusions are, however, interesting. Emphasis is laid upon the importance of the plantar fascia in binding the tuber calcanei with the metatarsal heads. None of the long leg muscles take in the tuber calcanei in their action: the same is true of the other ligaments of the foot. From these considerations it is concluded that the duty of maintaining the longitudinal tension of the foot, and therefore of maintaining the hollow of the foot, falls to the foot musculature proper. The task of supporting the foot laterally, so that the transverse arching is held, belongs to the long muscles. Concerning the function of these the author holds views which differ from those commonly accepted. The peroneus longus has as its principal action the support of the transverse arch, through its passage across the sole; and the tib. post. assists by pulling in the opposit direction. This pertains to the ordinary and indifferent position of the foot. Under one-sided burden the one or other muscle stiffens that side of the transverse arch in which its tendon ends by pressing the bones together into the most advantageous position.

Concerning the normal position of complete rest the author points out that we practically never stand completely at rest, but that there is always a play of muscles, now transferring the weight from heel to ball, now from inner to outer edge of sole, now from one foot to the other. The position of rest changes with our varying occupations. In resting upon the sole, the calcaneus represents only the posterior of two buttresses, transmitting its share of the burden to the ground, from which it receives the counterpressure necessary to prevent its being pulled forward by the tension stress acting upon it.

When the foot rises upon the ball, the mechanism is entirely different. The stresses upon the front foot and the lower ligaments are changed quantitatively only. The heel, however, loses its counter-pressure from the ground, and consequently its hold, which is, however, supplied by the pull of the gastrocnemius. The mechanism of the position is now discussed, and is illustrated by means of diagrams without which it is difficult to explain. The theory appears to be very plausible. The position on the ball of the foot, when not extreme, is held to be easier and longer endurable than that on the sole. The reason for it being unendurable for a long time, *when uninterrupted*, lies in the small surface applied to the ground, requiring an extra amount of muscle work to maintain the balance.

The mechanism of walking is also described on the same principles. There is also given a description of the apparatus by means of which the radiograms were made, and which is illustrated.—*A. H. Freiberg, Cincinnati.*

242. Hallux Valgus. By Roepke. *Deutsch. Zeit. f. Chir.*, Bd. LXXI. Heft 1.

Volkmann's view of this affection was that it belonged in the category of chronic deforming inflammatory processes. As the result of the careful study of twenty-three cases, and especially by means of the radiogram, the author feels able to reject this explanation. After describing the pathological changes found in the joint, he finds that, where there has been no contact of the joint surfaces, there is atrophy; where increased stress has been borne, increase of tissue has occurred. He therefore looks upon the deformity as produced by changes in static conditions, in the sense of Wolff's law.

He sees the initiative to this in the effect of improper foot-gear. The change in the action of the flexor hallucis is held to be the most important secondary effect of this. The internal lateral ligament makes sufficient pull upon its point of insection to prevent atrophy at this place. In fact, some hypertrophy may occur. The bunion is therefore looked upon simply as the median part of the metatarsal thrown out of function by the lateral deviation of the phalanx and the median deviation of the metatarsus, respectively.

The treatment depends upon the severity of the case and the complications. When once the valgus position becomes fixed, operative treatment is indicated. Schede's method, of chiselling off the internal projection of the joint, is followed by relief of symptoms, but not by radical cure. The various resections of the joint are rejected as unnecessarily mutilating. Reverdin's method is recommended. This consists in the Schede operation, if the radiogram shows it to be desirable, but also in the cuneiform osteotomy of the metatarsal just proximal to the bunion. The resulting wound is left open. Should suppuration of the bursa be present, this must first be allowed to heal after incision. A small splint is used in the after-treatment. Tenotomy and removal of the sesamoids are regarded as unnecessary. Radiograms and case reports are given.—*A. H. Freiberg, Cincinnati.*

243. **Morton's Painful Disease of the Toes.** By Walter G. Stern, M.D., Cleveland, Ohio. *Am. Med.*, Feb. 6, 1904, p. 221.

Stern reviews the literature of this condition, and refers to the three theories of its etiology. (*a*) The French school does not recognize such a disease, but refers the peculiar pains to fracture, inflammatory lesions, callosities, etc. (*b*) Morton believed it to be due to pressure on a branch of the plantar nerve, which wound about the neck of the metatarsal, by the head of the next outer metatarsal; but Halstead has shown such a condition does not exist,—namely, that the metatarsals do not hold such relationships, and that the nerves do not wind about the necks of the bones. (*c*) The majority of orthopedists believe that the condition is a static one, which involves the transverse arch of the foot, and is analogous to flat foot. There is alteration in the relationship of the heads of the metatarsals, and frequently the second one rests flat on the floor and develops a callosity.

Almost all sufferers belong to the higher classes, have been subjects of tight and narrow shoes which have weakened the foot. The pain is sudden in onset and agonizing. It may leave as suddenly. The foot is usually found to be broader than ordinary. The transtarsal arch is absent or much broken. The fourth metatarsal is tender, but not swollen or red, and is at times subluxated.

Morton's treatment was resection of the head of the fourth metatarsal, but the present-day treatment is to restore the arch by a pad or plate, and give a properly fitting shoe. A number of cases are detailed, illustrating this form of treatment and the success which followed it.—*J. T. Rugh, Philadelphia.*

244. **On Reduction of Congenital Club-foot in Adults** (with Demonstration of a Case, Fifty Years of Age, which had been reduced). (3 illustrations.) By Dr. Ernst Mayer, Cologne. *Zeit. f. orth. Chir.*, Bd. XII. Heft 1 & 2.

The author discusses in a general way the treatment of congenital club-foot by splints, operation, etc., and by the bloodless reduction, and considers that the application of the latter in adult cases is altogether too limited.

He describes at length a case of club-foot in a man of fifty which he reduced. He lays especial emphasis on overcoming the first and the most of the resistance with the hand; and, when this fails, he has recourse to the Stille-Lorenz reduction instrument. He thinks that club-foot, even in advanced age, can be treated by reduction, and favors more the use of manual methods and the different reduction instruments than the operative methods. *David Townsend, Boston.*

245. Supinator Weakness in Flat Foot and its Treatment. By Hovorka. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

The importance of strengthening the supinator muscles in the treatment of flat foot is emphasized. The author holds this to be the only method of giving relief in some cases. After some preliminary considerations of an anatomical and physiological character regarding the movements of the foot, he describes his "supination board," which is composed of two smooth boards, joined at their long edges at an angle of 160-165 degrees, and covered with soft felt. The patients are made to walk to and fro upon this. This is at first very difficult, but is quickly learned.

In addition the author recommends the free standing exercises which are also in vogue in this country. Massage also is to him an important part of the treatment.—*A. H. Freiberg, Cincinnati.*

246. The Treatment of Club-foot. By Vulpius. *Arch. f. Orthopædie*, Bd. I. Heft 3.

A general review of the subject presented to the International Congress in Madrid. Being a review, it is difficult to summarize the contents of the article.

Regarding the congenital form he concludes:—

The treatment should begin, if possible, no later than the second month, and should at this time consist of daily manual corrections, followed by flannel bandages. This is a preliminary to the "modelling correction," which is to be done in one or more sittings in the fourth month, and maintained by plaster. In older children this correction may be done at once, and, if difficult, in several sittings. Tenotomy of the tendo Achillis must be done almost invariably. The procedure cannot be said to be without danger. Fat embolism, fractures and bending of the leg bones, and decubitus may occur in spite of the greatest care. There are severe cases, even in the new-born, in which it is impossible to accomplish a satisfactory correction, or to succeed in retention, when this has been done. Having succeeded in correction and retention, the result is still sometimes marred by shortening of the foot, cavus, or planus, or other vestigiary deformity, some of which is not amenable to after-treatment.

A primary bloody operation on congenital club-foot is a mistake at any age. Manual or mechanical bloodless redressment should first be tried.

Concerning the treatment of paralytic talipes he considers separately the treatment of the deformity and the paralysis. In prophylaxis there are considered, in addition to the usual measures, tendon transplantation. This measure is discussed at some length. Tendon transplantation is to accomplish the maintenance of the foot in neutral position by the tension of the tendons, thereby preventing recurrence of deformity. In addition active movement is to be restored.

Arthrodesis is to be done only when there is no prospect of restoring active motion. He holds that it usually fails to produce perfect stiffening of the joint. In extensive paralysis he prefers to combine arthrodesis with tendon transplantation or shortening. Brace treatment is considered only as an adjuvant or substitute for the operative methods.—*A. H. Freiberg, Cincinnati.*

PARALYSIS.

247. Serratus Paralysis. By Richard Lightburn Sutton, M.D., Washington, D.C. *Jour. Am. Med. Ass'n*, vol. xli., Dec. 12, 1903, No. 24, p. 1473.

The author presents two cases of this rare type of peripheral palsy, the one in a woman, the other in a man. Both cases made complete or nearly complete recoveries, and the following comments on the cases are made:—

Cases of serratus paralysis, although well recognized, are of uncommon occurrence. Among 14,956 cases registered in the neurologic department of the Johns Hopkins Hospital there are but these two uncomplicated conditions of this character. In each the etiologic factor was a neuritis of the brachial plexus, affecting the nerve supply of the serratus secondarily. The primary cause in Case 2 was, in all probability, exposure, coupled with overexertion of the parts comprising the shoulder girdle. The practical points illustrated by these two cases are: 1. The relative infrequency with which the condition is encountered; 2. The intimate relationship its etiology bears to inflammation of the nerve trunks composing the brachial plexus; 3. The liability to unilateral involvement of the right side; 4. The favorableness of the prognosis in cases where trauma is not a factor in the causation; 5. The importance of early and continued treatment by galvanism.—*Robert B. Osgood, Boston.*

248. Congenital Intrauterine Poliomyelitis and Neuritis: The Question of their Occurrence and Influence upon So-called Congenital Deformities. By Joseph Fränkel, M.D., New York City, and B. Onuf, M.D., Sonyea, N.Y. *Am. Med.*, Jan. 16, 1904, p. 97.

Fränkel and Onuf detail the history of a case of congenital anterior poliomyelitis, a girl, aged four years, whose birth was normal and at full term, and who presented a negative family history. Immediately after birth there were noted double club-feet and inability to use the hands and feet naturally. At four years of age the child was well nourished and developed, but had "bilateral wrist-drop and drop-foot, face drawn to left side, and speech showed marked dysarthric features." There was also muscular atrophy of both arms and loss of power, dislocation of the right radius, but little loss of joint excursion, and absence of reflexes. The lower extremities showed asymmetry in length, loss of power, dislocation of left hip, disturbed gait, but normal reflexes. These conditions persisted until the child's death from diphtheria about two years later. A very careful and thorough autopsy and dissection was made by Dr. G. R. Elliott (who also reported the case), and the findings are tabulated in detail. A most exhaustive study of the nervous system is also recorded. The authors then proceed to discuss the anatomic findings with the view of determining the cause. The theories of intrauterine pressure or traumatism were eliminated by the muscular degeneration and paralysis, as was also that of arrest of development. The clinical history negatived the theory of primary muscular dystrophy of the atrophic type. The anatomic findings of hypertrophied connective tissue *between* the muscles instead of *within* them and the evidences of degeneration in the atrophied muscle rendered a diagnosis of polymyositis extremely improbable. The only remaining theories are those involving peripheral nerve changes or spinal lesions. The peripheral nerves were not examined, hence no opinion could be expressed as to that condition. In regard to the spinal lesions the conclusion is, "Weighing all the evidence, in conjunction with the clinical history, our conclusion is that in the case of congenital deformities reported by us the primary cause of the muscular changes, and incidentally also of the deformities, is either a poliomyelitis or a central neuritis of prenatal origin.

"Such conception would fully explain the muscular changes, and the skeletal deformities could again be easily accounted for, as induced by the muscular alterations. This has particular reference to the dislocation of the hip, which can be best explained on the theory of changed dynamics of the hip joint. The adductors, which in our case were markedly changed, would under normal circumstances help to press the head of the femur outward and downward, and thus, with the other muscles acting as antagonists, keep the femur head in position. Loss of the adductor action, by taking away the resistance offered by these muscles, would then naturally give the other muscles full sway, and the head of the femur would be dislocated in the direction of the least muscular resistance; namely, upward and inward." *J. T. Rugh, Philadelphia.*

TENDONS.

249. **A Practical Method of Tendon Suture.** By Suter. *Archiv f. klin. Chir.*, Bd. LXXII. Heft 3.

The method which is chiefly designed for the repair of accidental wounds involves a lateral approximation of the divided ends. It will be best understood by examinations of the diagrams.

Two cases are reported in which it seems to have worked very well.—*A. H. Freiberg, Cincinnati.*

MISCELLANEOUS.

250. **The Heidelberg Coaptation Splint, a New Splint Contrivance.** (With illustrations.) By O. Vulpius. *Wien. med. Presse*, No. 50.

The splint consists of flexible longitudinal rods and different size cross clasps, which can be fastened to the longitudinal rod by a guiding slit. The cross clasps are first bent to follow the outline of the body. Both parts are made of aluminum. The splint may be bought at Bingler's in Ludingshaven. *David Townsend, Boston (journal review Deutsch. med. Woch., Jan.* 1, 1904).

251. **A New Frame for the Treatment of Fractures of the Lower Extremities.** By J. H. Cunningham, Jr., M.D., *Boston M. & S. Jour.*, Dec. 31, 1903.

Cunningham describes and illustrates very clearly a useful mechanical device for assisting in applying plaster-of-Paris casts to the lower extremity. It is simple, easily made, and would seem to be particularly useful in fractures with considerable displacement, compound fractures, or in cases where the operator cannot have the services of a skilful assistant.—*John L. Porter, Chicago.*

252. **A Case of Myositis Ossificans Progressiva.** By Michelson. *Zeit. f. orth. Chir.*, Bd. XII. Heft 3.

A very carefully reported case, with instructive and well-reproduced radiograms.

There follows a description of the clinical history of these cases, in which the isolated ossifications after trauma and those occurring accidentally in the course of other diseases are excluded.

Although the clinical picture of the disease is characteristic and well defined, it is nevertheless difficult to draw sharply the line between this and the other ossifications occurring after trauma or even multiple exostosi formation. The bone formation always begins in the connective tissue, and is of the periosteal type. The formation of bone is very similar to the normal process. The various cell forms, cartilage cells, osteoblasts, bone corpuscles and trabeculæ, as well as hyaline cartilage, may be seen. Most authors are returning to Virchow's original conception of the disease, in which it is looked upon as a sort of tumor formation attributable to a congenital predisposition, to a local weakness or imperfection of the tissues. The final cause must probably be considered as a chemical irritant action of the blood, possibly a toxin effect.

Therapeutically there is absolutely nothing to offer these patients, except possibly the abstention from massage and other like measures, which are potent only for harm in these cases.—*A. H. Freiberg, Cincinnati.*

253. **Sulla Modalità di practicare la Vaccinazione Antitubercolare.** By E. Maragliano, Genoa. *Gazzetta degli Ospedali,* Milan, vol. xxv., No. 11.

Vaccination against Tuberculosis.—Maragliano has vaccinated a number of children against tuberculosis, the results constantly controlled by experiments on animals. The blood serum gradually acquired agglutinating power up to 1-100, the same as in the animals; and intravenous injection of the animals with virulent cultures of tubercle bacilli demonstrated that they were refractory, completely immune against tubercle infection. He thinks the probabilities are all in favor of the assumption that the children have been rendered similarly immune, although confirmation of the test by inoculation is, of course, out of the question. He proceeds as for small-pox vaccination; and there is a slight febrile reaction, as in the latter. By what he calls the "progressive" technic he commences with passive, and goes on to active immunization. He first injects immunizing substances plus substances derived from the bodies of killed bacilli, a material absolutely incapable of inducing infection. The third and final stage is the injection of products of the tubercle bacilli, also harmless. After a period of three to four months the serum has acquired antitoxic, antibacterial, and agglutinating properties. The controls treated step by step in the same way acquire these same properties, and prove completely immune to infection with virulent tubercle bacilli. The dead bodies of the bacilli are the chief factor in this vaccination, and the aim is to induce a focus of tubercular inflammation at the periphery entirely free from live tubercle bacilli. From this focus emanate the influences which induce the antitoxic, antibacterial, and agglutinating properties, the reaction of defence on the part of the organism. This insures a true and special vaccination. He makes the injection in the arm as for small-pox vaccination. A small amicrobian abscess develops, which is slow in healing, sometimes persisting for three or four months before completely healing. His experiences with animals have demonstrated beyond question, he believes, that it is possible to confer immunity by this simple technic. Maragliano adds that his research in this line preceded those of others by six years. Italy also took the lead in the administration of antitoxins by the mouth, as also in vaccinating man against tuberculosis. Elsewhere the question is still in the phase of mere hypothesis.—*Abst. Jour. Am. Med. Ass'n, April* 2, 1904.

254. **Study of Growth in Height.** By E. Forssberg. *Hygiea,* Stockholm, vol. lxv., No. 10.

Forssberg studies the length of the body in relation to age, sex, race, social standing, and other particulars.—*Abst. Jour. Am. Med. Ass'n, Feb.* 6, 1904.

255. **An Apparatus for Use in the Production of Successful Radiographs of the Lumbar Spine.**

Robert B. Osgood, of Boston, in a paper read before the Orthopedic Club of that city, describes an apparatus devised by him to aid in producing exact and useful radiographs of the lumbar spine. This device involves the principle of making the radiographic exposure under compression, brought forward by Albers-Schonberg. It consists of a conical tube of lead, with its great end, elliptical in shape, of a size to embrace the area extending from the ensiform to the pubes. Near its lesser end this tube is held within a simple wooden frame, to which are attached light steel arms extending out over the sides of the table. Traction downward is brought to bear on these arms by means of webbing straps made fast to the table sides. This traction is exerted on the leaden cone in its turn, and presses it firmly downward upon the abdomen, already rendered lax by posture, to the limit of the patient's toleration. This pressure pushes away the mass of soft tissues lying in front of the spine, and at the same time acts as a concentrator to the rays. The small end of the cone is covered by a diaphragm screen to disperse the parasitic rays; and the exposure is made in the usual way, with the anode-stream focussed through the cone and the photographic plate under the patient. The author claims for the apparatus the cardinal qualifications of simplicity, cheapness, and portability, in contrast to the cumbersome devices heretofore described. The paper is illustrated by beautiful radiographs of the lumbar spine, normal and diseased, produced in this manner.—*Percy Brown, Boston.*

256. **An Easily Detachable Plaster of Paris Cast.** By Charles P. Bechtol, M.D. *Jour. Am. Med. Ass'n,* Sept. 5, 1903, xli. 606, No. 10.

The advantages of perfect fitting and easily removable splints in the treatment of fractures are pointed out.

His method consists in the application of an accurate plaster of Paris cast over Gigli saws, so arranged that the cast can be quickly cut into two pieces and the halves used as splints.—*R. B. Osgood, Boston.*

257. **A Postural Anomaly in Hysteria.** By Riedinger. *Muen. med. Woch.,* No. 14, 1902.

Case that of a man of forty years, presenting marked forward flexion of the trunk, a twist forward of the pelvis on its horizontal axis causing severe lordosis, together with flexion and inward rotation of both knees. Not being able to attribute the condition to any organic lesion, he classifies it with the traumatic neuroses, since it occurred after an injury. The motor impairment did not involve certain muscle groups, but lay rather in the disturbed execution of particular co-ordinated movements. Differentiates it from hysterical scoliosis by its bilateral character.—*Abst. Zeitschr. für orth. Chir.,* x. 13.

258. **Neoplasms of the Mucous Bursæ.** By Adrian. *Beitr. z. klin. Chir.,* Bd. XXXVIII. Heft 2.

Seventeen cases have been found in the literature, and two original ones are reported: one of the prepatellar and one of the subdeltoid. The differential diagnosis is difficult, especially from hygroma.—*Abst. Centr. für Chir.,* 1903, p. 978.

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